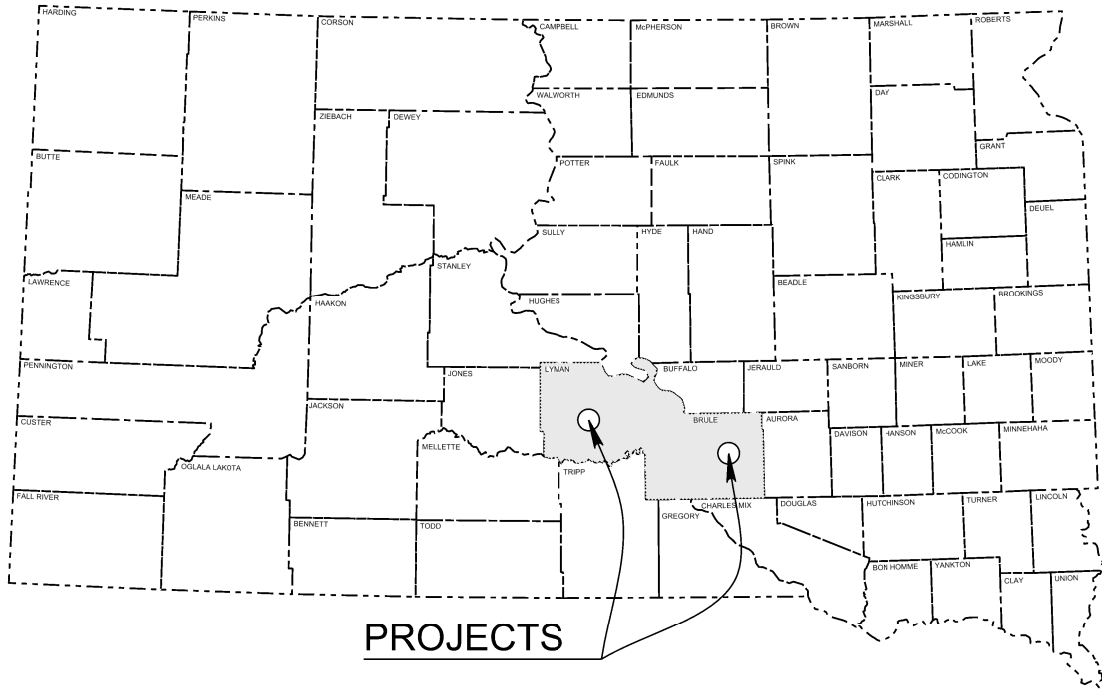


Plot Scale - 1:200

Plotted From - TRPR25289

Plotted From -



PROJECTS

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED

PROJECTS 090E-288 & 090W-368
SD HIGHWAY 45 (OVER INTERSTATE 90) &
INTERSTATE 90 (OVER US HIGHWAY 183)
BRULE & LYMAN COUNTIES

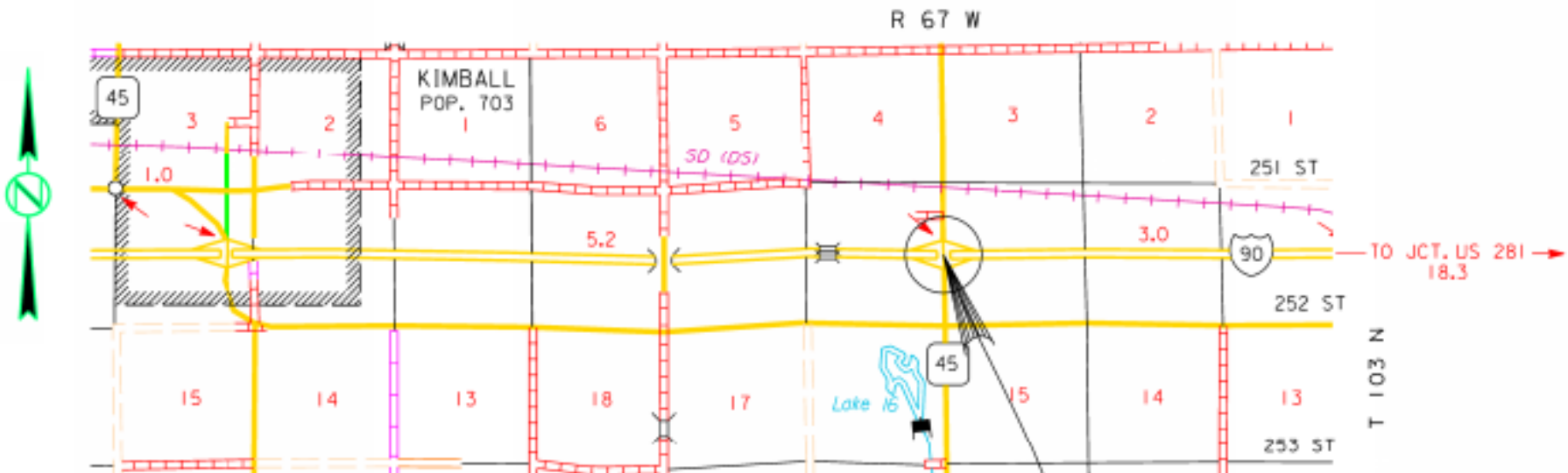
GIRDER REPAIR
PCN i65F & i63E

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	090E-288 & 090W-368	1	42

Plotting Date: 10/29/2020

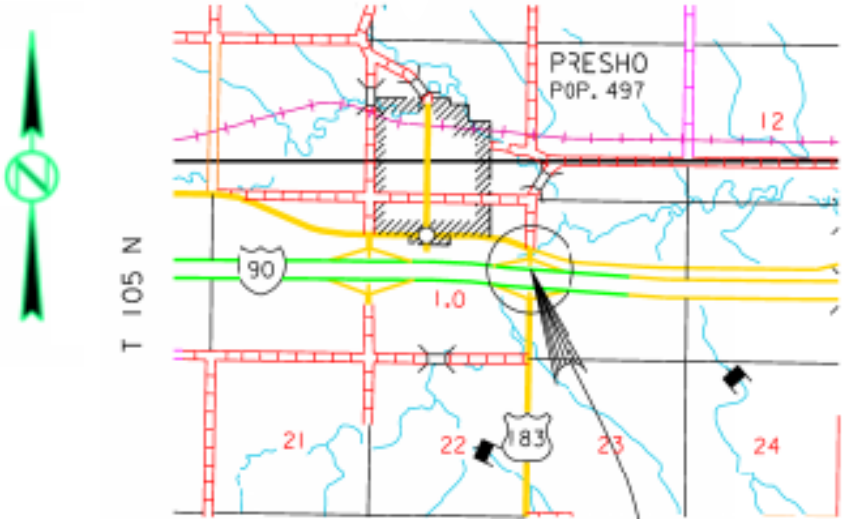
INDEX OF SHEETS

- Sheet 1: Title Sheet
- Sheet 2: Estimate of Quantities and Environmental Commitments
- Sheet 3: Traffic Control Notes
- Sheet 4: Traffic Control Sign Tables
- Sheets 5-24: Structure No. 08-310-135 Plans
- Sheets 25-39: Structure No. 43-160-205 Plans
- Sheets 40-42: Standard Plates



PCN i65F:
Structure No. 08-310-135
MRM 283.23
Over 130

DESIGN DESIGNATION	
AADT (2019)	4053
AADT (2044)	4863
DHV	772
D	50 %
DHV T%	11.7 %
AADT T%	25.7 %
V	80 mph



PCN i63E:
Structure No. 43-160-205
MRM 226.41
Over US183

DESIGN DESIGNATION	
AADT (2019)	3711
AADT (2044)	4732
DHV	804
D	51 %
DHV T%	10.8 %
AADT T%	23.3 %
V	80 mph

STORM WATER PERMIT
None

Estimate of Quantities and Environmental Commitments

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090E-288 & 090W-368	2	42

PCN i65F:

Str. No. 08-310-135:

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS
410E0320	Bolted Girder Splice	2	Each
410E0325	Remove and Replace Bolt Assembly	1	Each
410E0354	Remove and Replace Web and Flange	1	Each
410E0365	Remove and Replace Transverse Stiffener	6	Each
410E0380	Remove and Replace Steel Diaphragm	1	Each
410E0385	Repair Steel Diaphragm	1	Each
410E0410	Stud Shear Connector	1	Each
410E0508	Field Weld	1,157	In
410E0512	Grind Weld	14	In
410E0515	Drill Hole in Existing Steel	1	Each
410E0520	Surface Grinding of Structural Steel	206	SqIn
410E0550	Jack Superstructure, Steel Girder Bridge	Lump Sum	LS
410E3010	Magnetic Particle Weld Inspection	7,678	In
410E3020	Ultrasonic Weld Inspection	161	In
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	6,816	SqIn
412E0100	Bridge Repainting, Class I	Lump Sum	LS
412E0500	Paint Residue Containment	Lump Sum	LS
460E0070	Class A45 Concrete, Bridge Repair	1.2	CuYd
460E0300	Breakout Structural Concrete	1.2	CuYd
460E0650	Roadway Canopy	Lump Sum	LS
480E5000	Galvanic Anode	2	Each
634E0010	Flagging	40.0	Hour
634E0110	Traffic Control Signs	246.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	1	Each
634E0330	Temporary Raised Pavement Markers	1,920	Ft
634E0420	Type C Advance Warning Arrow Board	1	Each
634E1260	Truck/Trailer Mounted Attenuator	1	Each

SPECIFICATIONS

Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

UTILITIES

The Contractor will contact the involved utility companies through South Dakota One Call (1-800-781-7474) prior to starting work. It will be the responsibility of the Contractor to coordinate work with the utility owners to avoid damage to existing facilities.

If utilities are identified near the improvement area through the SD One Call Process as required by South Dakota Codified Law 49-7A and Administrative Rule Article 20:25, the Contractor will contact the Project Engineer to determine modifications that will be necessary to avoid utility impacts.

PCN i63E:

Str. No. 43-160-205:

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS
410E0350	Remove and Replace Web	2	Each
410E0365	Remove and Replace Transverse Stiffener	4	Each
410E0380	Remove and Replace Steel Diaphragm	1	Each
410E0410	Stud Shear Connector	8	Each
410E0508	Field Weld	858	In
410E0512	Grind Weld	24	In
410E0515	Drill Hole in Existing Steel	1	Each
410E0520	Surface Grinding of Structural Steel	192	SqIn
410E3010	Magnetic Particle Weld Inspection	6,124	In
410E3020	Ultrasonic Weld Inspection	305	In
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	5,184	SqIn
412E0100	Bridge Repainting, Class I	Lump Sum	LS
412E0500	Paint Residue Containment	Lump Sum	LS
460E0070	Class A45 Concrete, Bridge Repair	0.3	CuYd
460E0300	Breakout Structural Concrete	0.3	CuYd
460E0650	Roadway Canopy	Lump Sum	LS
460E8100	Repair Underside of Bridge Deck	4	SqFt
480E5000	Galvanic Anode	6	Each
634E0010	Flagging	40.0	Hour
634E0110	Traffic Control Signs	440.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	1	Each
634E0330	Temporary Raised Pavement Markers	1,920	Ft
634E0420	Type C Advance Warning Arrow Board	1	Each
634E1260	Truck/Trailer Mounted Attenuator	1	Each

ENVIRONMENTAL COMMITMENTS

The SDDOT is committed to protecting the environment and uses Section A Environmental Commitments as a communication tool for the Engineer and Contractor to ensure that attention is given to avoid, minimize, and/or mitigate an environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency with permitting authority can delay a project if identified environmental impacts have not been adequately addressed. Unless otherwise designated, the Contractor’s primary contact regarding matters associated with these commitments will be the Project Engineer. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office.

Additional guidance on SDDOT’s Environmental Commitments can be accessed through the Environmental Procedures Manual found at: <http://www.sddot.com/resources/Manuals/EnvironProcManual.pdf>

For questions regarding change orders in the field that may have an effect on an Environmental Commitment, the Project Engineer will contact the

Environmental Office at 605-773-3098 or 605-773-4336 to determine whether an environmental analysis and/or resource agency coordination is necessary.

COMMITMENT H: WASTE DISPOSAL SITE

The Contractor will furnish a site(s) for the disposal of construction and/or demolition debris generated by this project.

Action Taken/Required:

Construction and/or demolition debris may not be disposed of within the Public ROW.

The waste disposal site(s) will be managed and reclaimed in accordance with the following from the General Permit for Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) will not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Environmental Office and the Project Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements will apply:

- Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials will be buried in a trench completely separate from wood debris. The final cover over the construction and/or demolition debris will consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the Public ROW will be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor will control the access to waste disposal sites not within the Public ROW with fences, gates, and placement of a sign or signs at the entrance to the site stating “No Dumping Allowed”.
- Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) will be incidental to the various contract items.

SEQUENCE OF OPERATIONS

The Contractor will submit a sequence of operations for approval two weeks prior to the preconstruction meeting.

Operations for PCN I65F will be conducted with two lane divided lane closures.

Operations for PCN I63E will be conducted with two-way traffic lane closures.

GENERAL TRAFFIC CONTROL

Existing traffic control on SD 45 for PCN I65F will remain in place until the work is complete.

Existing guide, route, informational logo, regulatory, and warning signs will be temporarily reset and maintained during construction. Removing, relocating, covering, salvaging, and resetting of existing traffic control devices, including delineation, will be the responsibility of the Contractor. Cost for this work will be incidental to the contract unit prices for the various items unless otherwise specified in the plans. Any delineators and signs damaged or lost will be replaced by the Contractor at no cost to the State.

All temporary traffic control sign locations will be set in the field by the Contractor and verified by the Engineer prior to installation.

All construction operations will be conducted in the general direction of traffic movement.

If there is a discrepancy between the traffic control plans, standard plates, and the MUTCD, whichever is more stringent will be used, as determined by the Engineer.

Unless otherwise stated in these plans, work will not be allowed during hours of darkness.

Traffic Control Signs, as shown in the Estimate of Quantities, are estimates. Contractor's operation may require adjustments in quantities, either more or less. Payment will be for those signs actually ordered by the Engineer and used.

Fixed location signing placed more than 4 calendar days prior to the start of construction will be covered or laid down until the time of construction. The covers must be approved by the Engineer prior to installation. The cost of materials, labor, and equipment necessary to complete this work will be incidental to other contract items. No separate payment will be made.

TRAFFIC CONTROL SIGNS

Sufficient traffic control devices have been included in these plans to sign two interstate mainline closures and one two lane highway lane closure.

FLAGGING AND PILOT CAR OPERATIONS

Operations will be conducted so that the traveling public will not have to wait longer than 15 minutes at the flagger station.

It is required that the flaggers and pilot car operators be able to communicate with one another. If an emergency vehicle needs to pass through the project, the Contractor will be required to expedite traffic movement. All costs associated with this will be incidental to the contract unit price per hour for "Flagging".

TRUCK/TRAILER MOUNTED ATTENUATOR

The Contractor will furnish truck or trailer mounted attenuator(s) to be used for the duration of the project. Truck or trailer mounted attenuators (TMAs) will meet the crashworthy requirements of NCHRP 350 or MASH Test Level 3. TMAs will be used and maintained in accordance with the manufacturers' recommendations.

The TMAs should be utilized on the project where workers and/or equipment are working next to the centerline of the roadway with live traffic in the adjacent lane, or as directed by the Engineer. The TMAs will be removed from the roadway at the end of each working day. The TMAs will remain the property of the Contractor at the end of the project.

The TMAs will be paid for at the contract unit price per each for Truck/Trailer Mounted Attenuator. Payment will be full compensation for furnishing, maintaining, relocating and removing as many times as required by the Engineer and the Contractor's operations.

In the event a TMA is hit while in service, the manufacturer will assess the TMA and make a recommendation as to whether it can be repaired or needs to be replaced. The Department will reimburse the Contractor for repairs as documented by invoices or pay for another TMA to be deployed to the project as needed.

TEMPORARY RAISED PAVEMENT MARKERS

Temporary raised pavement markers will be used for marking edge lines, lane lines, and centerlines. Temporary raised pavement markers will be used on all new permanent surfacing sections of roadway and on existing surfacing where temporary marking locations are different than existing marking locations, unless noted or as directed by the Engineer.

Temporary raised pavement markers will be attached to the roadway surface with a flexible non-permanent bituminous adhesive capable of being removed from the roadway surface or with an adhesive approved by the Engineer.

All costs to furnish, install, replace if necessary, and remove the markers will be incidental to the contract unit price per foot for "Temporary Raised Pavement Markers".

WORK ZONE SPEED REDUCTION

The Department is required to obtain a speed reduction resolution prior to the installation of any SPEED LIMIT (R2-1) signs shown on standard plate 634.63. To provide adequate time for the resolution to be enacted, the Contractor will inform the Engineer a minimum of 3 weeks prior to the scheduled installation of any work zone speed reduction signs on the project. The information provided by the Contractor will include the anticipated date of sign installation, the newly reduced speed limit, the location of the work zone, and the anticipated completion date of work requiring the speed reduction.

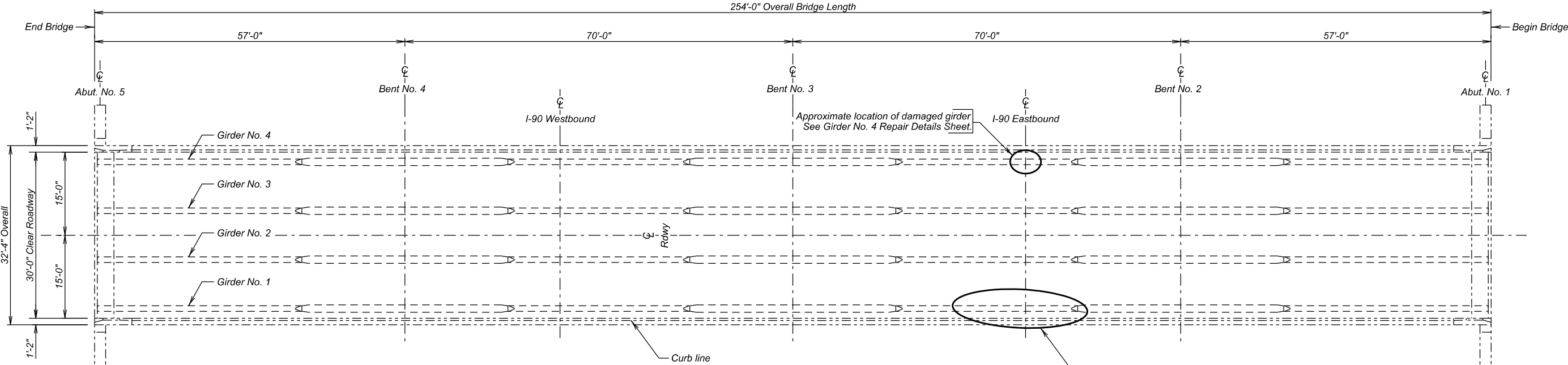
I65F - ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS

SIGN CODE	SIGN DESCRIPTION	EXPRESSWAY / INTERSTATE			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R2-1	SPEED LIMIT 45	2	36" x 48"	12.0	24.0
R2-1	SPEED LIMIT 65	3	36" x 48"	12.0	36.0
R2-1	SPEED LIMIT 80	1	36" x 48"	12.0	12.0
R2-6aP	FINES DOUBLE (plaque)	1	36" x 24"	6.0	6.0
W3-5	SPEED REDUCTION AHEAD (45 MPH)	1	48" x 48"	16.0	16.0
W3-5	SPEED REDUCTION AHEAD (65 MPH)	2	48" x 48"	16.0	32.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)	2	48" x 48"	16.0	32.0
W20-1	ROAD WORK AHEAD	2	48" x 48"	16.0	32.0
W20-5	LEFT or RIGHT LANE CLOSED AHEAD	2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)	1	48" x 48"	16.0	16.0
G20-2	END ROAD WORK	1	48" x 24"	8.0	8.0
		EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT 246.0			

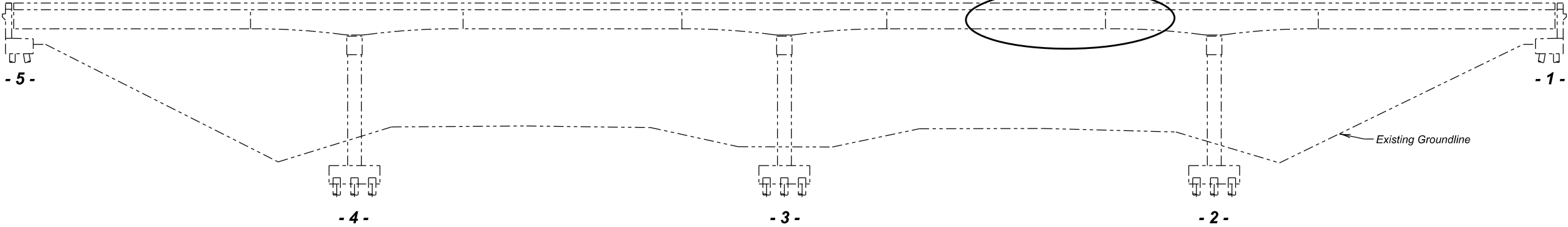
I63E - ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS

SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD				EXPRESSWAY / INTERSTATE			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT	NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R2-1	SPEED LIMIT 45		24" x 30"	5.0		2	36" x 48"	12.0	24.0
R2-1	SPEED LIMIT 65		24" x 30"	5.0		3	36" x 48"	12.0	36.0
R2-1	SPEED LIMIT 80		24" x 30"	5.0		1	36" x 48"	12.0	12.0
R2-6aP	FINES DOUBLE (plaque)		24" x 18"	3.0		1	36" x 24"	6.0	6.0
W3-5	SPEED REDUCTION AHEAD (45 MPH)		48" x 48"	16.0		1	48" x 48"	16.0	16.0
W3-5	SPEED REDUCTION AHEAD (65 MPH)		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W20-1	ROAD WORK AHEAD	4	48" x 48"	16.0	64.0	2	48" x 48"	16.0	32.0
W20-4	ONE LANE ROAD AHEAD	2	48" x 48"	16.0	32.0		48" x 48"	16.0	
W20-5	LEFT or RIGHT LANE CLOSED AHEAD		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)	4	48" x 48"	16.0	64.0		48" x 48"	16.0	
W21-5	SHOULDER WORK	2	48" x 48"	16.0	32.0		48" x 48"	16.0	
G20-2	END ROAD WORK	4	36" x 18"	4.5	18.0	1	48" x 24"	8.0	8.0
		CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT 210.0				EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT 230.0			

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090 E-288	5	42



PLAN



ELEVATION

INDEX OF BRIDGE SHEETS -

- Sheet No. 1 - Layout for Girder Repair
- Sheet No. 2 - Estimate of Structure Quantities and Notes
- Sheet Nos. 3 thru 8 - Notes (Continued)
- Sheet No. 9 - Girder No. 1 Repair Details (A)
- Sheet No. 10 - Girder No. 1 Repair Details (B)
- Sheet No. 11 - Girder No. 1 Repair Details (C)
- Sheet No. 12 - Girder No. 1 Repair Details (D)
- Sheet No. 13 - Girder No. 1 Repair Details (E)
- Sheet No. 14 - Bolted Splice Repair Details (A)
- Sheet No. 15 - Bolted Splice Repair Details (B)
- Sheet No. 16 - Girder No. 4 Repair Details
- Sheet Nos. 17 thru 20 - Original Construction Plans

LAYOUT FOR GIRDER REPAIR

FOR

254'-0" CONT. COMP. GIRDER BRIDGE

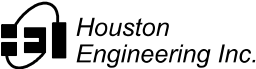
30'-0" ROADWAY 0° SKEW
OVER I90 SEC. 9-10-T103N-R67W
STR. NO. 08-310-135 090 E-288
PCN I65F

BRULE COUNTY

S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2020

1 OF 20



-X271-

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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ESTIMATE OF STRUCTURE QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT	REMARKS
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS	
410E0320	Bolted Girder Splice	2	Each	
410E0325	Remove and Replace Bolt Assembly	1	Each	
410E0354	Remove and Replace Web and Flange	1	Each	
410E0365	Remove and Replace Transverse Stiffener	6	Each	
410E0380	Remove and Replace Steel Diaphragm	1	Each	
410E0385	Repair Steel Diaphragm	1	Each	
410E0410	Stud Shear Connector	1	Each	See Special Provision
410E0508	Field Weld	1,157	In	
410E0512	Grind Weld	14	In	
410E0515	Drill Hole in Existing Steel	1	Each	
410E0520	Surface Grinding of Structural Steel	206	SqIn	
410E0550	Jack Superstructure, Steel Girder Bridge	Lump Sum	LS	
410E3010	Magnetic Particle Weld Inspection	7,678	In	
410E3020	Ultrasonic Weld Inspection	161	In	
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	6,816	SqIn	
412E0100	Bridge Repainting, Class I	Lump Sum	LS	
460E0070	Class A45 Concrete, Bridge Repair	1.2	CuYd	
460E0300	Breakout Structural Concrete	1.2	CuYd	
412E0500	Paint Residue Containment	Lump Sum	LS	
460E0650	Roadway Canopy	Lump Sum	LS	
480E5000	Galvanic Anode	2	Each	

SPECIFICATIONS

1.

Design Specifications: AASHTO Standard Specifications for Highway Bridges 17th Edition using Load Factor Design.
2.

Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications and Special Provisions as included in the Proposal.
3.

All Welding and Welding Inspection shall be in conformance with the AASHTO/AWS Bridge Welding Code D1.5M/D1.5:2015 unless otherwise noted in this plan set.

PRE-CONSTRUCTION MEETING

A pre-construction meeting is required prior to beginning the repair work. The purpose of the meeting is to review the plans and procedures because of the specialty work involved. At a minimum, a representative from the Contractor and all Subcontractors shall attend this meeting along with Department personnel from the Area Office and Bridge Office. The contractor must notify the Bridge Construction Engineer and the Area Office at least five days prior to the meeting.

DETAILS AND DIMENSIONS OF EXISTING BRIDGE

All details and dimensions of the existing bridge, contained in these plans, are based on the original construction plans and shop plans and are provided as information only. It is the Contractor's responsibility to inspect and verify the actual field conditions and any necessary as-built dimensions affecting the satisfactory completion of the work required for this project.

SHOP PLANS

Shop plans shall be required as specified by Section 410.3A of the Construction Specifications.

GENERAL CONSTRUCTION

1.

Welder certification shall be in accordance with Section 410.3D of the Construction Specifications.
2.

The new steel web plates, flange plates, and flange splice plates shall be ASTM A709 Gr. 36 T2. The new steel stiffener plates, and diaphragm plates shall be ASTM A709 Gr. 36.

NOTICE – LEAD BASED PAINT

Be advised that the paint on the steel surfaces of the existing structure is a paint containing lead. The Contractor should plan his/her operations accordingly and inform employees of the hazards of lead exposure.

SCOPE OF BRIDGE WORK

- All work on this structure shall be accomplished under traffic with the traffic control as shown elsewhere in the plans.

1.

Remove and capture all loose concrete on the underside of the bridge deck adjacent to Girder G1 to prevent any pieces from falling into traffic during the repair process. This shall not be done directly over traffic.

2.

Identify and mark all yield lines, yielded zones, and surface nicks and gouges.

3.

Grind surface nicks and gouges.

4.

Clean and prepare area to be tested as specified by the Bridge Welding Code and these notes.

5.

Nondestructive test fillet welds, crack tips and potential crack tips at the locations indicated in the plans.

6.

Repair crack tips and weld flaws found by nondestructive testing prior to heat straightening. No heat straightening shall be performed until the nondestructive testing is complete and any necessary repairs are done for the member to be straightened.
7.

Heat straighten damaged girder G1 and G4 including bottom flanges, web, and transverse stiffeners.
8.

Perform nondestructive testing required after heat straightening and perform any repairs required.
9.

Remove and replace the plan specified damaged diaphragms.
10.

Remove and replace the plan specified damaged stiffeners.
11.

Install the temporary girder supports at the plan specified locations and remove and replace damaged web and flange sections of girder G1.
12.

Perform nondestructive testing required after repairs.
13.

Repair crack tips, and weld flaws found by nondestructive testing after repairs.
14.

Place prime coat on area to be spliced and install bolted splice.
15.

Install canopy and breakout and repair portion of the bridge deck.
16.

Prepare and paint work affected areas and new structural steel.

FIELD WELDING PROCEDURES

1.

Approved Welding Procedure Specifications (WPS) will be required for this project, using the Shielded Metal Arc Welding (SMAW) process and an approved E7018 electrode from Table 4.1 of the Bridge Welding Code. The proposed WPSs for this project shall be submitted on Form O-2, from Annex O of the Bridge Welding Code, to the Bridge Construction Engineer for approval at least 2 weeks prior to construction.
2.

Preparation of the base metal prior to welding shall be in accordance with Clause 3 of the Bridge Welding Code. Existing paint shall be removed a distance of 2 inches from each side of the weld.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR

254'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 08-310-135

October 2020 2 OF 20

FIELD WELDING PROCEDURES (CONTINUED)

3.

Preheat will be required. Preheat and interpass temperature requirements shall be in accordance with Clause 4.2 of the Bridge Welding Code. The minimum pre-heat and interpass temperature shall be 320 degrees F for welds to the 11/16” girder flanges and 300 degrees F for welds to the 5/16” girder web as determined from Annex G of the Bridge Welding Code for high restraint conditions. Temperature indicating crayons shall be the minimum acceptable method for monitoring preheat and interpass temperatures.
4.

SMAW electrode atmospheric exposure requirements shall comply with Clause 4.5 of the Bridge Welding Code. Electrodes shall be purchased in hermetically sealed containers. If the container shows evidence of damage, the electrodes shall be dried in a drying oven for at least one hour at temperatures between 700 and 800 degrees F before they are used. Immediately after opening a hermetically sealed container or removal of the electrodes from a drying oven, electrodes shall be stored in ovens at a temperature of at least 250 degrees F. Electrodes exposed to the atmosphere upon removal from drying or storage ovens or hermetically sealed containers shall be used within four hours maximum or redried at 450 to 550 degrees F for two hours minimum. Electrodes exposed to the atmosphere for periods less than four hours may be returned to a storage oven and maintained at a minimum of 250 degrees F for a minimum of four hours before reissue. Electrodes shall be redried no more than one time. Electrodes which have been wet shall not be used.
5.

All welds shall be cleaned in accordance with Clause 3.11 of the Bridge Welding Code. Completed welds and adjacent areas shall be cleaned of all weld splatter, slag, smoke and heat affected paint. No intermittent or “stitch” welds will be allowed.
6.

E7018 electrodes shall be used for tack welds. The size of tack welds shall not be greater than 5/16”. Tack welds shall be positioned so they will be incorporated into, and re-melted by, the final weld. Tack welds shall be thoroughly cleaned prior to any weld placement.
7.

Groove joint fit-up tolerances shall be +1/16”, -1/8” for root opening and +10°, -5° for the bevel angle for Joint Designation B-U2 as per Clause 3.3.4 of the Bridge Welding Code. The removal dimensions of the damaged web material and the dimensions of the new web plates shall be closely controlled to achieve the specified fit-up tolerances. All groove welds shall be ground to a flush contour. Grinding shall be longitudinal. Transverse grinding will not be allowed.

WELD INSPECTION AND NONDESTRUCTIVE TESTING (NDT)

1.

The Contractor shall be responsible for retaining a qualified Testing Agency to perform Visual, Magnetic Particle (MT), and Ultrasonic (UT) inspection of existing and new welds and to locate existing and potential crack tips. Inspectors performing Visual, MT, and UT inspection and determining crack tip locations shall be certified in accordance with Section 410.3 D of the Construction Specifications. The Contractor shall submit the Testing Agency to the Department at the Preconstruction meeting for approval by the Bridge Construction Engineer.

2.

All Nondestructive Testing (NDT), required cleaning, preparation, and inspection shall be done in accordance with Clause 6 of the Bridge Welding Code. Existing paint shall be removed from the steel surfaces that require NDT. Power tools used for cleaning shall be in accordance with SSPC-3. The MT inspection shall be performed by the yoke method using half-wave rectified direct or alternating current. MT inspection results shall be reported on Form O-7 of Annex O and UT results shall be reported on Form F-4 of Annex F of the Bridge Welding Code.
3.

The Contractor shall identify and mark all yield zones, yield lines, and associated damage and provide this information to the Engineer prior to the initiation of heat straightening and testing by either visual inspection or measurements.
4.

Testing for defects and crack tips shall be made prior to any heat straightening. Repair options for the defects and crack tips shall be determined by the Bridge Construction Engineer—see notes on Repairs for NDT Determined Flaws. Repairs shall be made prior to any heat straightening.
5.

As a minimum, the existing fillet welds shall be inspected as noted below. Defects shall be clearly marked on the girder in accordance with the Bridge Welding Code and a written record of the defects shall be given to the Engineer for transmittal to the Bridge Construction Engineer. Any suspected cracks shall be verified by magnetic particle inspection with the crack tips located. Crack tip locations shall be clearly marked on the girder and a written record of the crack tip location shall be given to the Engineer for transmittal to the Bridge Construction Engineer. Notify the Bridge Construction Engineer if any cracks or crack tips are located in the girder flange.

Girder 1:

- a.

Visually Inspect 100% of the existing fillet welds in the deformed and damaged area. The deformed length is estimated to be 35 feet.
- b.

MT test the top and bottom flange to web weld, on both sides of the web, a minimum of 12” beyond any yielded girder zones for an estimated 1,680 inches.
- c.

MT test both sides of the stiffener to web weld and both sides top and bottom of the stiffener to flange welds at the diaphragms to be removed and replaced. This includes the diaphragm stiffeners on each end of the diaphragm and the outside transverse stiffener for and estimated 384 inches.
- d.

On the transverse stiffeners to be heat straightened or have welds removed and replaced, MT test the stiffener welds to web top, bottom, and both sides of the stiffener for an estimated 288 inches.
- e.

In the area of web and flange replacement, MT test an area extending 6” on all sides of the removal area on each face for an estimated 3,408 square inches.

Girder 4:

- a.

Visually Inspect 100% of the existing fillet welds in the deformed and damaged area. The deformed length is estimated to be 18 feet.
- b.

MT test the top and bottom flange to web weld, on both sides of the web, a minimum of 12” beyond any yielded girder zones for an estimated 864 inches.
6.

The above listed quantities and areas are provided as an estimate based on field documentation of the damage. If any other areas are identified as having potential flaws or require heat straightened these areas shall be tested as directed by the Engineer.
7.

After heat straightening, the areas listed above shall be retested to ensure no additional cracks have developed. The estimated weld length and area for re-testing is 3,216 inches and 3,408 square inches.
8.

New fillet welds of primary members (between web and flange) shall be 100% visually inspected and 100% magnetic particle inspected. Based on the results of the magnetic particle and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed fillet welds and any recommended repairs. Rejected defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs are complete. The estimated length for MT inspection is 424 inches.
9.

All other new fillet welds shall be 100% visually inspected and 20% magnetic particle inspected. Based on the results of the magnetic particle and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed fillet welds and any recommended repairs. Rejected defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs are complete. The estimated length for MT inspection is 199 inches.
10.

New groove welds shall be 100% visually inspected and 100% ultrasonically tested. Based on the results of the ultrasonic and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed groove welds and any recommended repairs. Rejected defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs are complete. The estimated length for UT inspection is 161 inches.

NOTES (CONTINUED)

FOR

254’-0” CONT. COMP. GIRDER BRIDGE

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WELD INSPECTION AND NONDESTRUCTIVE TESTING (NDT)
(CONTINUED)

11. The plans listed quantity for nondestructive testing inspection is only an estimate. Magnetic Particle Weld Inspection and Ultrasonic Weld Inspection will be measured to the nearest inch. Magnetic Particle Weld Inspection, Impact Damage Repair will be measured to the nearest inch and area computed to the nearest square inch. Measurement shall be approved by the Bridge Construction Engineer.
12. All costs including labor, equipment, cleaning, and any incidentals necessary to perform the visual inspection, magnetic particle inspection and crack tip location shall be incidental to the contract unit price per inch for Magnetic Particle Weld Inspection.
13. All costs including labor, cleaning, paint removal, equipment, and any incidentals necessary to perform the visual inspection, magnetic particle inspection and crack tip location in the areas to be removed and replaced shall be incidental to the contract unit price per square inch for Magnetic Particle Weld Inspection, Impact Damage Repair.
14. All costs to remove the paint and clean all fillet welds to be nondestructive tested and remove the paint and clean all visible or potential crack tip locations shall be incidental to the contract unit price per inch for Magnetic Particle Weld Inspection or contract unit price per square inch for Magnetic Particle Weld Inspection, Impact Damage Repair.
15. All costs including labor, cleaning, equipment, and any incidentals necessary to perform the visual inspection and ultrasonic inspection of groove welds shall be incidental to the contract unit price per inch for Ultrasonic Weld Inspection.

REPAIRS FOR NDT DETERMINED FLAWS

1. Repair options for weld defects and crack tips shall be determined by the Bridge Construction Engineer. Two potential repair options are:
- a. Drill 1" diameter hole in all crack tips.
- b. Repair fillet weld defects by removing the weld with the air carbon arc process and then grinding flush. Grinding shall be in the longitudinal direction. Transverse grinding will not be allowed. The repair shall then be re-welded in accordance with the Bridge Welding Code.
2. All labor, equipment, materials and incidentals necessary to drill holes in the web shall be incidental to the contract unit price per each for Drill Hole in Existing Steel.
3. All labor, equipment, materials and incidentals necessary including air carbon arc removal and grinding of welds shall be incidental to the contract unit price per inch for Grind Weld.
4. All labor, equipment, materials and incidentals necessary to re-weld the repair shall be incidental to the contract unit price per inch for Field Weld.
5. Other repair options shall be at the discretion of the Bridge Construction Engineer.

HEAT STRAIGHTENING

1. This Contract includes heat straightening of steel girders, including bottom flange, web, transverse stiffeners and diaphragms. Heat straightening is considered specialty work and only the following contractors are allowed to do this work. Contact:

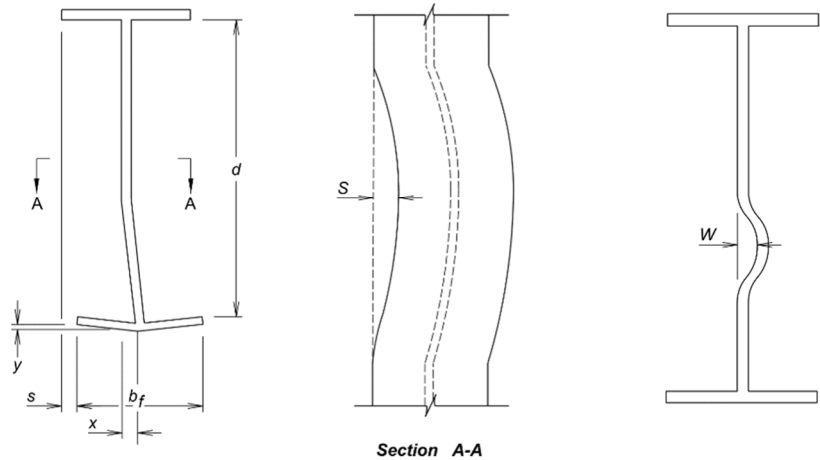
Judd Holt
International Straightening Incorporated
901 E. Bristol Drive
Bismarck, ND 58501
Telephone: (701) 223-5972 or (701) 751-1683
Fax: (701) 751-1683
E-mail: isisteel@gmail.com
Website: www.steelstraightening.com

Darryl Thomas
Flame On, Inc.
12632 Wagner Road
Monroe, WA 98272
Telephone: (425) 397-7039
Fax: (425) 397-7002
Cellular: (425) 501-9855
E-mail: d.thomas@flameon.com
Website: www.flameoninc.com

2. Heat Straightening requires nondestructive testing of both new and existing welds. The Contractor shall use a qualified testing agency subject to the approval by the Bridge Construction Engineer. The Contractor shall submit the testing agency to the Area Office for approval of the Bridge Construction Engineer. See Weld Inspection & Nondestructive Testing notes elsewhere in these plans.
3. The equipment used for heat straightening shall be an oxygen-fuel combination. The fuel shall be propane or acetylene. The application of heat shall be by single or multiple orifice tips only. The size of the tip shall be proportional to the thickness of the heated material. As a guide, the following table shows the recommended tip sizes. No cutting torch heads are permitted.

Steel Thickness (in)	Orifice Type	Size
< 1/4	Single	3
3/8	Single	4
1/2	Single	5
5/8	Single	7
3/4	Single	8
1	Single Rosebud	8 3
2	Single Rosebud	8 4
3	Rosebud	5
> 4	Rosebud	5

4. The temperature of all steel during heat straightening shall not exceed 1,200° F. The Contractor shall use one or more of the following methods for verifying temperatures during heat straightening.
- a. Temperature sensitive crayons
- b. Pyrometer
- c. Infrared non-contact thermometer
5. Material should be heated in a single pass and shall be allowed to air cool to below 250°F prior to re-heating.
6. Hot Mechanical Straightening and Hot Working will **NOT** be allowed.
7. Jacks used to aide heat straightening shall be placed so that forces are relieved as straightening occurs during cooling. Jacking shall be limited so that the maximum bending moment in the heated zone is less than 50% of the plastic moment capacity of the member or 50% of yield for local forces. The yield of the material is 36 ksi.
8. The final dimensions of heat straightened structural members shall conform to the following tolerances:



d = original depth of web
bf = original width of flange
X = final displacement of web ≤ maximum of d/100 or 1/4"
Y = final displacement of edge of flange ≤ 1/4"
W = maximum final local deformation in web ≤ 1/4"
S = sweep of flange from original edge of flange ≤ 1/2" over 20 ft

NOTES (CONTINUED)

FOR

254'-0" CONT. COMP. GIRDER BRIDGE

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HEAT STRAIGHTENING (CONTINUED)

9. All labor, materials, equipment, and any incidentals necessary to perform the required heat straightening shall be incidental to the contract lump sum price for Heat Straighten Steel Member(s).

JACKING SUPERSTRUCTURE

1. Vertical Jacks shall be used to support the girder on both sides of splice No. 2 at the plan specified locations, until the web and flange replacement is complete. The jacking points and loads shall be as shown in plans.
2. The vertical jacks shall have a lock nut for mechanical load holding with hydraulic pressure released.
3. The jacks shall include calibrated gauges, which indicate jack load.
4. Each jack shall have a bearing plate at both ends of sufficient area and thickness to limit the bearing stress on the loaded areas of concrete to not more than 1,600 psi, asphalt to not more than 2,000 psf and to limit the bearing stress on the loaded area of steel to not more than 20,000 psi.
5. Caution shall be exercised when transferring the girder reactions to and from the jacks to ensure that no damage to any of the existing structural components will occur due to the jacking procedure. Any damage to any of the structural components of the bridge caused by the jacking procedure will be repaired as approved by the Engineer at no cost to the Department.
6. The Contractor shall be required to submit a detailed jacking plan, approved and stamped by a Professional Engineer registered with the State of South Dakota. The jacking procedure shall be submitted 30 days prior to the start of work for the approval by the Office of Bridge Design. Included in this procedure will be the type, number, positioning, temporary supports, size, and method of synchronization between multiple jacks.
6. All costs for materials, labor, equipment and incidentals necessary to perform the vertical jacking as shown by these plans shall be included in the contract lump sum price for Jack Superstructure, Steel Girder Bridge.

REMOVE AND REPLACE WEB AND FLANGE SECTIONS

1. Cut and remove the portions of the web, flange, and weld as shown on the plans by the air carbon arc process or plasma cutting. Weld removal shall be air carbon arc gouging. All cut edges shall be ground smooth to their final size in preparation for welding. Grinding shall be longitudinal. Transverse grinding will not be allowed. The removed portions of the web and flange shall be disposed of by the Contractor.
2. The web sections shall be replaced and welded as shown in the plan details.
3. Holes in existing flange and in splice plates on the existing side of the splice shall be drilled with the entire bolted splice, flange section, and web section held securely in place by use of clamps or other devices; no tack welds will be allowed to hold splice plates. New holes shall be a maximum 1/16" larger than the diameter of the bolt. It will be permitted to use one of the splice plates (either the top or bottom) as a template.
4. During the removal and replacement procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).

5. All labor, equipment, materials, welding, and any incidentals necessary to remove and replace the damaged portions of the web and flange shall be incidental to the contract unit price per each for Remove and Replace Web and Flange.

REPAIR STEEL DIAPHRAGM

1. A portion of the existing diaphragm shown in the plans shall be removed prior to heat straightening and nondestructive testing. Removed diaphragm portion shall not be reused and shall be disposed of by the Contractor. After all heat straightening is complete, the diaphragm will be repaired.
2. Cutting of the existing diaphragm shall be accomplished using the air carbon arc process or plasma cutting. Weld removal shall be air carbon arc gouging.
3. Extreme care shall be exercised during the weld removal and cutting process so that no damage to the surrounding metal occurs. Any damage to the surrounding metal caused by the weld removal and/or cutting process shall be repaired by the Contractor to the satisfaction of the Engineer at no cost.
4. During the repair procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).
5. Grind all surfaces cut with air carbon arc process to remove high carbon deposits, provide a smooth finish, and radius all edges to accept paint.
6. All costs including equipment, material and labor to remove a portion of the steel diaphragm and to repair the steel diaphragm shall be incidental to the contract unit price per each for Repair Steel Diaphragm.

REMOVE AND REPLACE DIAPHRAGMS

1. The existing diaphragm and diaphragm stiffeners shown in the plans shall be removed prior to heat straightening and nondestructive testing. Removed diaphragm portion shall not be reused and shall be disposed of by the Contractor.
2. Cutting of the existing diaphragm and diaphragm stiffener shall be accomplished using the air carbon arc process or plasma cutting. Weld removal shall be by air carbon arc gouging.
3. The diaphragm and diaphragm stiffener shall be replaced and welded as shown in the plans, after the web repairs and heat straightening are complete.
4. During the removal and replacement procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).
5. All labor, materials, and equipment necessary to remove and replace the diaphragms and diaphragm stiffeners as shown on the Plans will be incidental to the contract unit price per each for Remove and Replace Steel Diaphragm.

REMOVE AND REPLACE DAMAGED WELDS

1. The damaged welds shown in the plans shall be replaced by grinding damaged weld and re-welding. Grinding shall be in the longitudinal direction. Transverse grinding will not be allowed. Re-welding shall in accordance with the Bridge Welding Code.
2. All repaired welds shall be checked by non-destructive (MT) testing, see Weld Inspection & Nondestructive Testing (NDT) notes. Repair options for the defects found by the non-destructive testing shall be determined by the Bridge Construction Engineer.
3. All costs associated with grinding the damaged welds including all materials, equipment and labor shall be incidental to the contract unit price per inch for Grind Weld.
4. All costs associated with re-welding the transverse stiffener welds including all materials, equipment and labor shall be incidental to the contract unit price per inch for Field Weld.

REMOVAL OF SURFACE NICKS AND GOUGES

1. Grind the bottom flange of girder G1 as directed by the Engineer, to remove all sharp edges from surface nicks and gouges created by vehicle impact. The amount of material removed shall be kept at the absolute minimum necessary to remove the sharp edges and to minimize the section reduction of the existing structural members. Grinding shall be longitudinal. Transverse grinding will not be allowed. The grinding shall be done prior to heat straightening the girder.
2. All surface nicks and gouges shall be checked by non-destructive MT testing after grinding; see Weld Inspection & Nondestructive Testing (NDT) note. Repair options for the defects found by the nondestructive testing shall be determined by the Bridge Construction Engineer.
3. The quantity provided for Surface Grinding of Structural Steel is an estimate. The payment quantity will be per square inch as determined by the Engineer. This item may not be encountered and could be removed from the plans.
4. All costs associated with removing sharp edges from surface nicks and gouges including all materials, equipment and labor shall be incidental to the contract unit price per square inch for Surface Grinding of Structural Steel.

NOTES (CONTINUED)

FOR

254'-0" CONT. COMP. GIRDER BRIDGE

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FIELD BOLTED GIRDER SPLICES

1. The new flange section shall be bolted to the existing flanges according to the details in the plans. Bolts to be used shall be 7/8" diameter ASTM F3125 Grade A325. Each bolt shall be supplied with a hardened heavy hex nut, 1 hardened washer and 1 direct tension indicator. Follow the High Strength Bolt requirements shown In Section 410 of the Construction Specifications.

2. Shim plates shall conform to ASTM A709, Grade 36, except material less than 1/4" in thickness may be ASTM A570, Grade D.

3. High strength bolts, nuts, washers and direct tension indicators shall be stored in such a manner that they will be kept clean and free from any rust or foreign material. Direct tension indicators shall be installed under the bolt head and the nut shall be the turned element.

4. Any misalignments of the existing flanges at the splice locations will require shim plates between the flanges and the splice plates. The quantity, size, and location of shim plates shall be such that complete contact between the flanges and splice plates occurs to minimize any warpage that may result from bolt tightening. The thickness of the shim plates shall be maximized such that a minimum number of shim plates are required. Details for the shim plates shall be included in the shop plans.

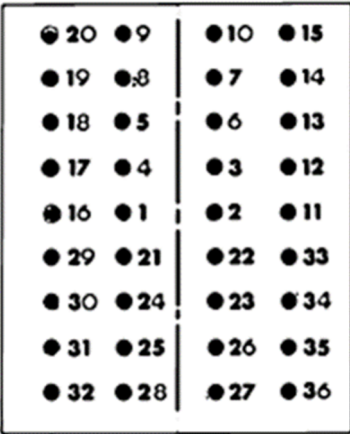
5. Contact surfaces of the bolted connections shall be clean and free from all oil, paint with exception of a primer in accordance with 411.3 B.3 of the Construction Specification, lacquer, and other coatings. Commercial blast cleaning of the steel-to-steel contact areas shall be done to SSPC SP 6 finish.

6. The Contractor shall have the following options for drilling holes in splice plates, flanges and shims:

Shop drill the splice plate for each flange splice with undersize holes of 3/16" less than nominal bolt diameters and use as templates for field drilling through the flange and remaining splice and shim plates. Field drilling shall be done with all splice components securely held in the proper position. The contractor may elect to use a single field drilling operation in which case holes shall be drilled to a maximum of 1/16" larger than the bolt's nominal diameter. As an alternate, the contractor may elect to first subdrill and then subsequently ream the assembled splice connection to a final maximum diameter of 1/16" larger than the nominal bolt diameter. Regardless of the contractor's preferred field drilling procedure, the splice shall be disassembled and all burrs and cuttings removed prior to assemble of the splice.

7. Bolts in flanges shall be placed with heads down.

8. The splice bolts shall be tightened in a pattern that starts at the center of the splice and progresses outward in all directions. A suggested bolting sequence is shown below.



9. Bolted girder splices will be measured by each assembly furnished and accepted complete in place. The combination of shims, and flange splice at the same location on a girder constitutes a splice. Bolted girder splices measured as provided above, will be paid for at the contract price per each for Bolted Girder Splice. Such payment shall be full compensation for all material, labor, equipment, tools and incidentals necessary to satisfactorily complete this work.

CONCRETE BREAKOUT

1. The existing deck shall be broken out to the limits shown on the plans. Breakout limits shall be defined with a 3/4" deep sawcut (unless specified otherwise in these plans), where practical, as approved by the Engineer. All existing reinforcing steel that will be exposed is scheduled for reuse and shall be cleaned and straightened to the satisfaction of the Engineer. Care shall be taken not to damage the reinforcing steel during concrete breakout. Any reinforcing steel that is damaged during concrete breakout shall be replaced or repaired, as approved by the Engineer, by the Contractor at no cost to the Department.

2. Extreme care shall be used during concrete breakout to prevent nicks, gouges, scratches, or damage to existing structural steel components to be reused. Prior to deck removal, the limits of the girder top flanges shall be marked on top of the bridge deck. The Contractor shall not be allowed to use any impact type breakout equipment larger than power driven hand tools for slab removal within six inches of the actual limits of the top flange. At no time shall the use of any breakout method that will nick, gouge, or scratch the flange, or any other structural steel component to be reused, be allowed. If any nicks, gouges, scratches, or other damage occurs, the Office of Bridge Design shall be immediately notified. All damage shall be repaired by the Contractor as recommended by the Office of Bridge Design. All costs involved in repairing any damage, including any non-destructive testing that may be required, shall be at the expense of the Contractor. Any shear connectors damaged due to the Contractor's operation shall be repaired by the Contractor at no cost to the Department. Any shear connectors which have failed in service shall be replaced with 7/8" diameter x 4" end welded stud shear connectors for all girders and will be paid for at the contract unit price per each for Stud Shear Connector.
3. All broken out concrete, discarded reinforcing bars and expansion devices shall be disposed of by the Contractor. Any disposal of discarded material shall be in accordance with the Environmental Commitments.
4. The contract unit price per cubic yard for Breakout Structural Concrete shall include breaking out concrete, cleaning and straightening existing reinforcing steel, and disposal of all broken out material. All broken out concrete and other discarded material shall become the property of the Contractor and shall be disposed of on a site obtained by the Contractor and approved by the Engineer. See the Environmental Commitment notes.

NOTES (CONTINUED)

FOR

254'-0" CONT. COMP. GIRDER BRIDGE

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ROADWAY CANOPY

- The Contractor shall construct a rigid canopy above the interstate under the structure. The canopy is intended to capture smaller debris and not act as safety net for falling deck sections. As such, no traffic shall be allowed under an area of active deck removal even with the canopy in place. The exception is traffic will be allowed under the canopy if the only removal occurring is using hand tools and chipping hammers. The canopy is an added safeguard and does not relieve the Contractor of any responsibility for the safety of the public. The canopy shall meet the following minimum requirements.
 - The entire system shall be above the bottom of the girders.
 - Attachments shall not be made to the girders using welding.
 - The canopy shall be of a design and material which can adequately capture and contain falling debris as selected by the Contractor and approved by the Engineer.
 - The canopy shall be constructed for an entire span before any breakout can occur in that span.
 - The erection of the canopy shall be completed in a manner which will cause the least inconvenience to the traveling public.
- The Contractor shall submit a detailed Demolition Plan, 30 days prior to any bridge deck removal. This Demolition Plan shall include all canopy details, bridge deck breakout details, a sequence of traffic control, and a sequence of bridge deck removal.
- The Roadway Canopy shall be paid for at the contract lump sum price of Roadway Canopy. This payment shall include all construction, maintenance, and removal of the Roadway Canopy.

GALVANIC ANODE

- The Contractor shall furnish and place galvanic anodes in the concrete repair areas specified in this plan set.
- The galvanic anodes shall be supplied as one of the following:
 - Galvashield XP2
Vector Corrosion Technologies
65114 140th Ave.
Wabasha, MN 55981
Phone: (507) 259-2481
Website: www.vector-corrosion.com
 - Sentinel Silver
Euclid Chemical Company
19218 Redwood Road
Cleveland, OH 44110
Phone: (800) 321-7628
Website: www.euclidchemical.com

- Sika FerroGard 670
Sika Corporation US
201 Polito Avenue
Lyndhurst, NJ 07071
Phone: (800) 933-7452
Website: <http://usa.sika.com>
- The anodes shall be placed in accordance with manufacturer's recommendations and as approved by the Engineer. The anodes have not been shown on the drawings. The Contractor shall provide shop drawings of the galvanic anode installation including locations of the individual anodes to the Office of Bridge Design.
 - The anodes shall be placed with a minimum ¾" cover and shall be set in embedding mortar per the manufacturer's recommendations. The anodes shall be fully encased in the concrete repair material. Where adequate cover does not exist, a concrete pocket shall be chipped out behind the anode to provide sufficient cover. The Contractor may need to chip around the reinforcing bar locally at the anode installation to make the electrical connection. The reinforcing steel at the connection location shall be cleaned per the manufacturer's recommendations to provide sufficient electrical connection and mechanical bond.
 - The electrical continuity of the electrical connections and reinforcing steel shall be confirmed per the manufacturer's recommendations.
 - The Contractor shall provide manufacturer's product literature and installation instructions to the Engineer 10 days prior to installation.
 - All costs associated with placing anodes including labor, equipment, materials and incidentals shall be included in the contract unit price per each for Galvanic Anode.

CLASS A45 CONCRETE, BRIDGE REPAIR

The type of cement, concrete strength requirements, aggregate requirements, slump and air requirements for the contract item Class A45 Concrete, Bridge Repair shall conform to the requirements of Section 460 of the Construction Specifications for A45 concrete used in bridge decks.

STUD SHEAR CONNECTOR

- Prior to welding of the studs to the existing girders, the top surfaces of the existing girders that are to have studs welded on shall be clean of dirt, rust and any other foreign matter.
- The shear connectors that will be attached to the existing girders shall be 7/8" diameter x 4 inches long and shall conform to ASTM A108, Grade 1015, 1018, or 1020. The connector shall meet the following minimum mechanical property requirements for type B studs:

Tensile Strength	60ksi
Yield Strength	50ksi
Elongation	20%
Reduction of area	50%
- The shear connectors shall be installed in accordance with the Special Provision for Shear Connector Field Installation (Per Each).

AIR CARBON ARC CUTTING AND GOUGING

- All removal of diaphragms and welds called for by the plans shall be accomplished using the air carbon arc process unless noted otherwise. Plasma cutting will also be allowed. If the contractor plans to use plasma cutting, the Bridge Construction Engineer shall be notified and will provide the Contractor with additional requirements for this cutting method.
- Before any air carbon arc cutting or gouging begins, lay out all cut lines on the steel surfaces using a marker that will be visible during the cutting process.
- When grinding to a specified shape or dimension is required after air carbon arc cutting, lay out the shape on the steel surface with a visible marker and grind to the layout line. Air carbon arc gouging shall be done using DC, electrode positive.
- Extreme care shall be exercised during the cutting or gouging process so that absolutely no damage (such as nicks, gouges, splattering) to the surrounding metal occurs. Any damage caused by the air carbon arc process shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the Department.
- Grind all surfaces cut or gouged with the air carbon arc process to remove high carbon deposits, provide a smooth finish, and prepare metal for welding and/or to accept paint.

PAINT RESIDUE REMOVAL AND CONTAINMENT

- Paint removal on the existing bridge shall be in accordance with Section 412 of the Construction Specifications, except as modified by these notes.
- The Contractor shall plan his operation to prevent releases of lead-containing material and other particulate matter into the surrounding air, water, and onto the ground, slope protection, and pavement. The Contractor shall be responsible for any corrective actions should a spill occur.

NOTES (CONTINUED)

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STATE OF	PROJECT	SHEET NO	TOTAL SHEETS
S.D.	090 E-288	12	42

PAINT RESIDUE REMOVAL AND CONTAINMENT (CONTINUED)

3. Collect all visible paint particles and blasting residue containing paint at the end of each workday from the work area. Inspect outside the containment and collect any paint particles or blasting residue that escaped the work area. Collect waste material by manual means, vacuum, or another method approved by the Engineer. Do not use air pressure or streaming water to assist in the waste collection process that could disperse the waste material.
4. In the event of a spill or inadvertent release, the Contractor shall immediately stop work, notify the Engineer, and report the release to the South Dakota Department of Environmental and Natural Resources (DENR). The Contractor shall be responsible for completing a spill reporting form and for all costs associated with appropriate corrective actions.

To report a release or spill, call DENR at (605) 773-3296 during regular office hours (8 a.m. to 5 p.m., Central Time). To report the release after hours, on weekends or holidays, call State Radio Communication at (605) 773-3231. Reporting the release to DENT does not meet any obligation for reporting to other state, local, or federal agencies. Therefore, the Contractor must also contact local authorities to determine the local reporting requirements for releases. DENR recommends that spills also be reported to the National Response Center at (800) 424-8802.

BRIDGE REPAINTING, CLASS I

1. All work affected areas and all new structural steel shall be painted in accordance with Section 412 of the Construction Specifications.
2. The intent at the heat straightened & repaired areas is to paint the entire girder surface for a distance of 6” outside of the outer edges of the heat straightening. The finished girder shall have a uniform paint appearance as approved by the Engineer. For informational purposes, the approximate total area under this item of repair is 641 square feet. The actual work affected area will only be known after all the nondestructive testing and heat straightening is complete.

NOTES (CONTINUED)

FOR

254'-0” CONT. COMP. GIRDER BRIDGE

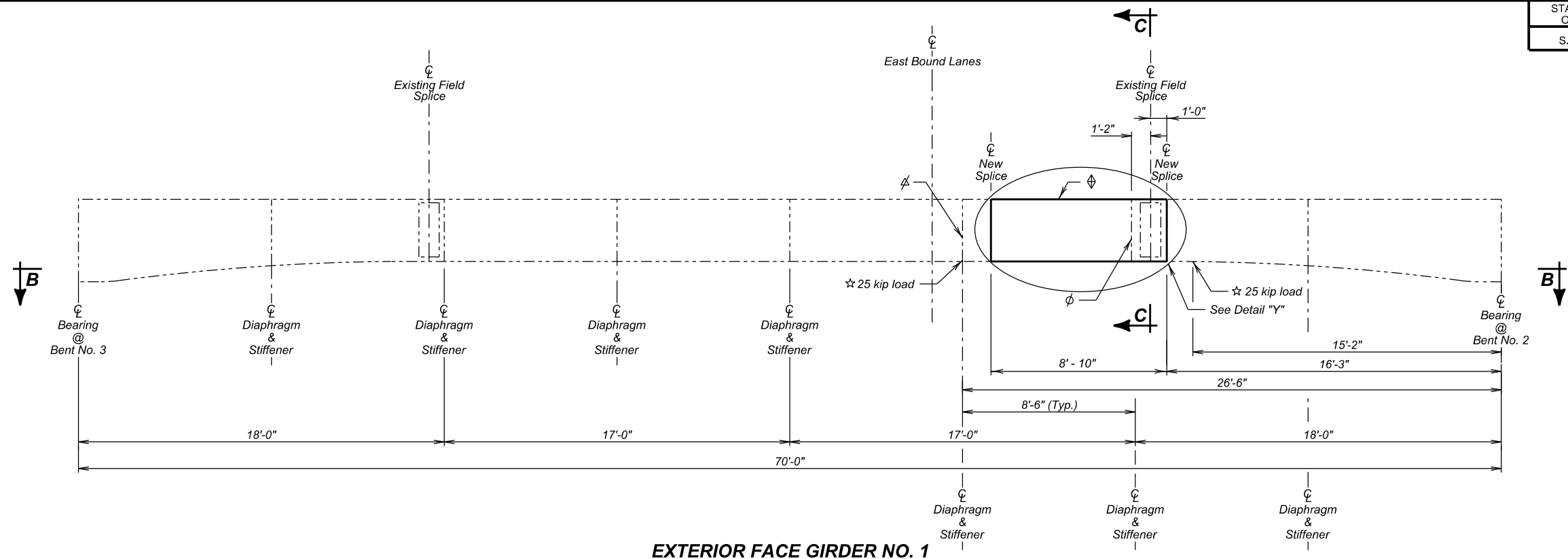
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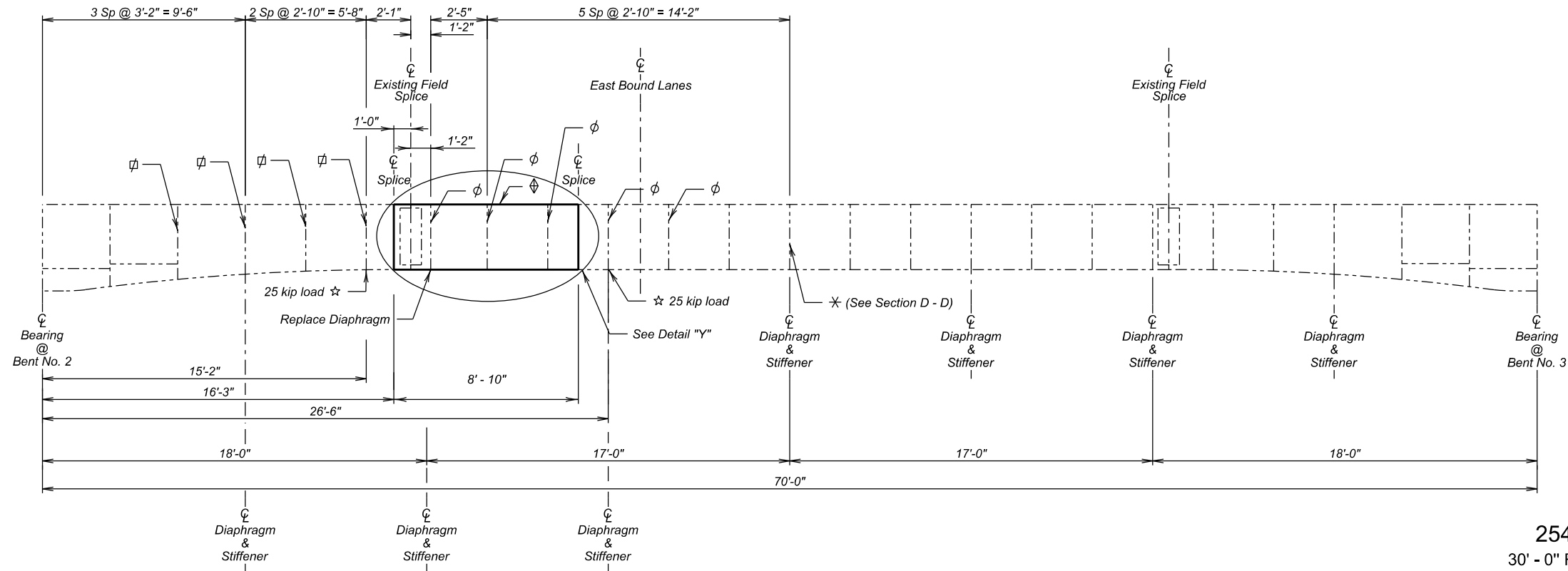
8 OF 20

DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090 E-288	13	42



EXTERIOR FACE GIRDER NO. 1



INTERIOR FACE GIRDER NO. 1

- Heat Straighten Stiffener
- Replace Stiffener
- Repair Portion of Bridge Deck
- Temporary Jacking & Girder Support
- Repair Steel Diaphragm
- Test / Repair Stiffener Welds

GIRDER NO. 1 REPAIR DETAILS (A)

FOR

254' - 0" CONT. COMP. GIRDER BRIDGE

30' - 0" ROADWAY

OVER I90

STR. NO. 08-310-135

0° SKEW

SEC. 9/10-T103N-R67W

090 E-288

NOTES:

Girder web and bottom flange shall be heat straightened as necessary.

Concrete deck not shown for clarity.

Section B-B located on Sheet No. 10 of 20

Section C-C located on Sheet No. 12 of 20

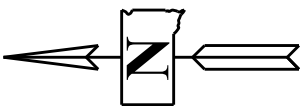
Section D-D located on Sheet No. 13 of 20

Detail "Y" located on Sheet No. 11 of 20

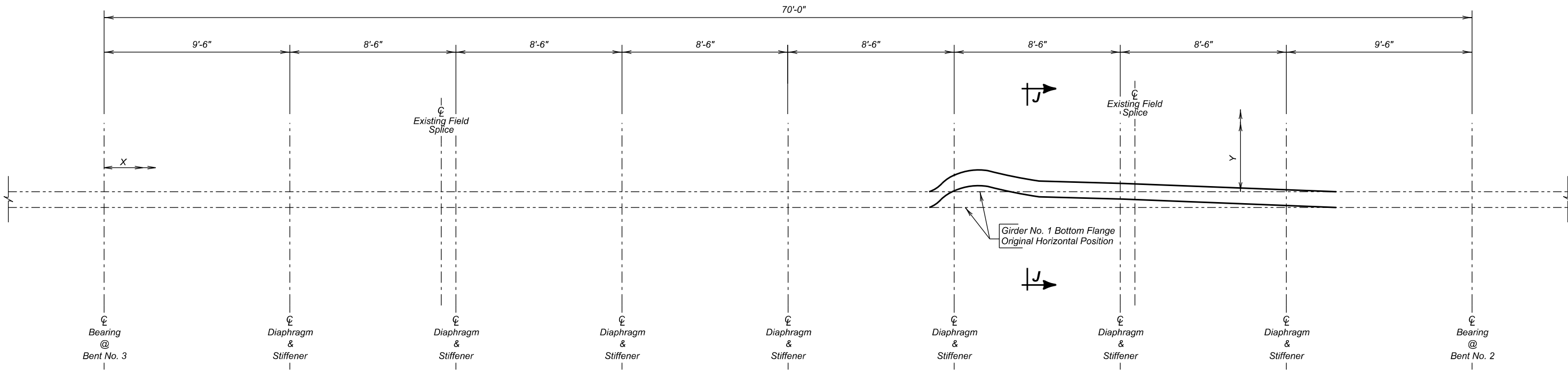
BRULE COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2020

9 OF 20

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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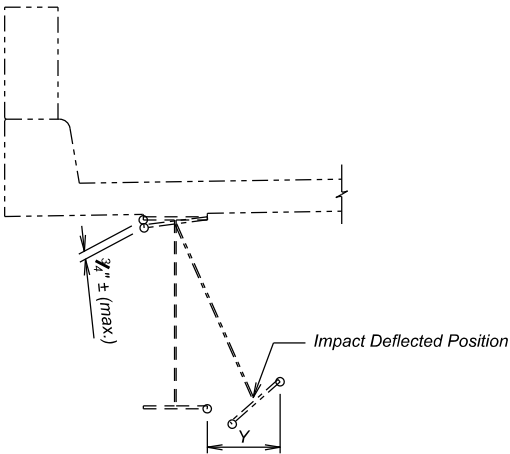


STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090 E-288	14	42



SECTION B-B
GIRDER NO. 1 - BOTTOM FLANGE

NOTE:
Heat Straighten Girder No. 1 Bottom Flange.
See Notes.



SECTION J-J
(Shown at X Measurements)

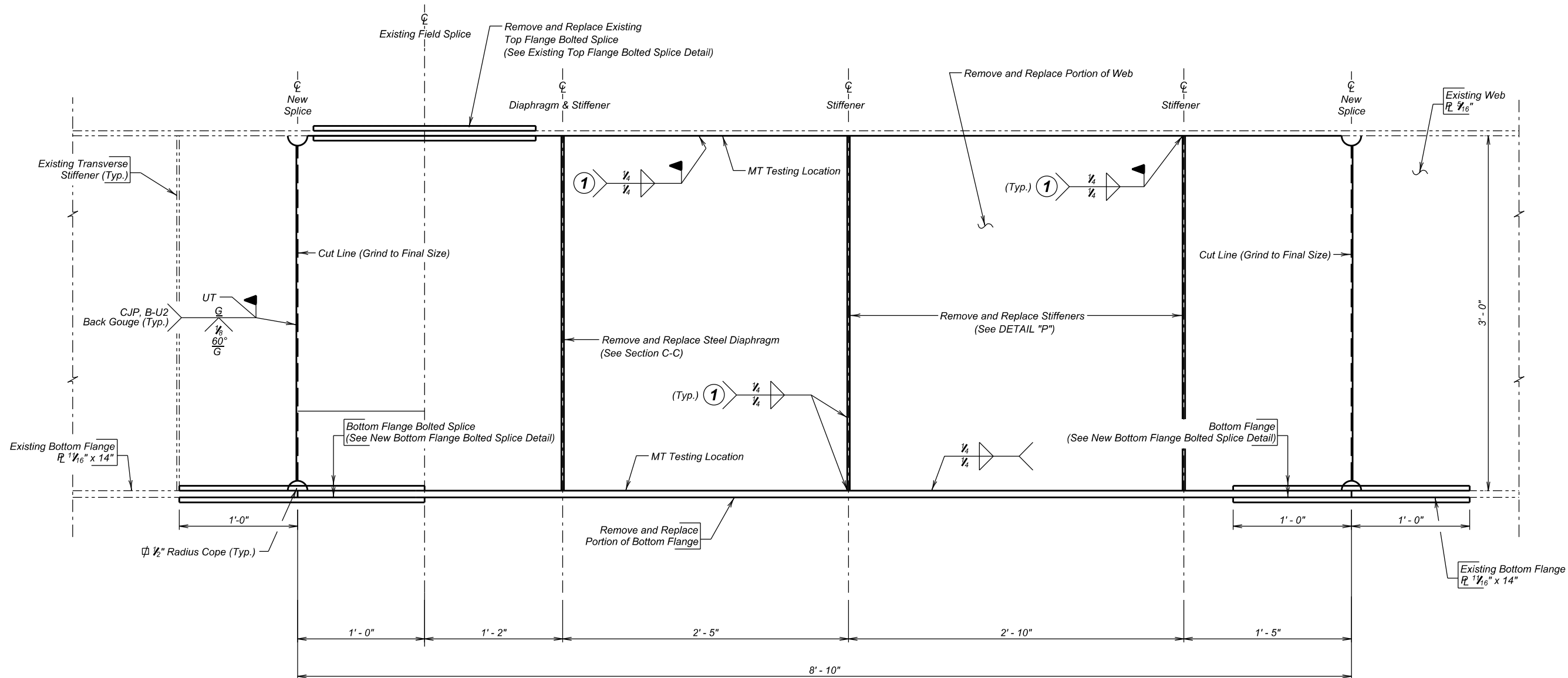
GIRDER NO. 1 HORIZONTAL IMPACTS DEFLECTED POSITION MEASUREMENTS	
X	Y
35'-0"	0"
43'-6"	15 1/4"
45'-2"	19 1/4"
46'-10"	18 1/2"
52'-0"	9 1/2"
60'-6"	5 1/2"
70'-0"	0"

GIRDER NO. 1 REPAIR DETAILS (B)
FOR
254' - 0" CONT. COMP. GIRDER BRIDGE
30' - 0" ROADWAY
OVER I90
STR. NO. 08-310-135
0° SKEW
SEC. 9/10-T103N-R67W
090 E-288

BRULE COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2020

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090 E-288	15	42



DETAIL "Y"

(Interior Girder No. 1)

⌀ After the new web section has been welded into place, resize the cope to a 1" radius by grinding the cut surface ensuring the weld tips are ground out. The finished surface shall be smooth.

① All fillet welds attaching web to flange and stiffeners to girder flanges and webs shall terminate 1/8" from edge of stiffener, flange, stiffener clip or cope, whichever is applicable.

NOTE:

Section C-C located on Sheet 12 of 20

Detail "P" located on Sheet 12 of 20

GIRDER NO. 1 REPAIR DETAILS (C)

FOR

254' - 0" CONT. COMP. GIRDER BRIDGE

30' - 0" ROADWAY

OVER I90

STR. NO. 08-310-135

0° SKEW

SEC. 9/10-T103N-R67W

090 E-288

BRULE COUNTY

S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2020

11 OF 20

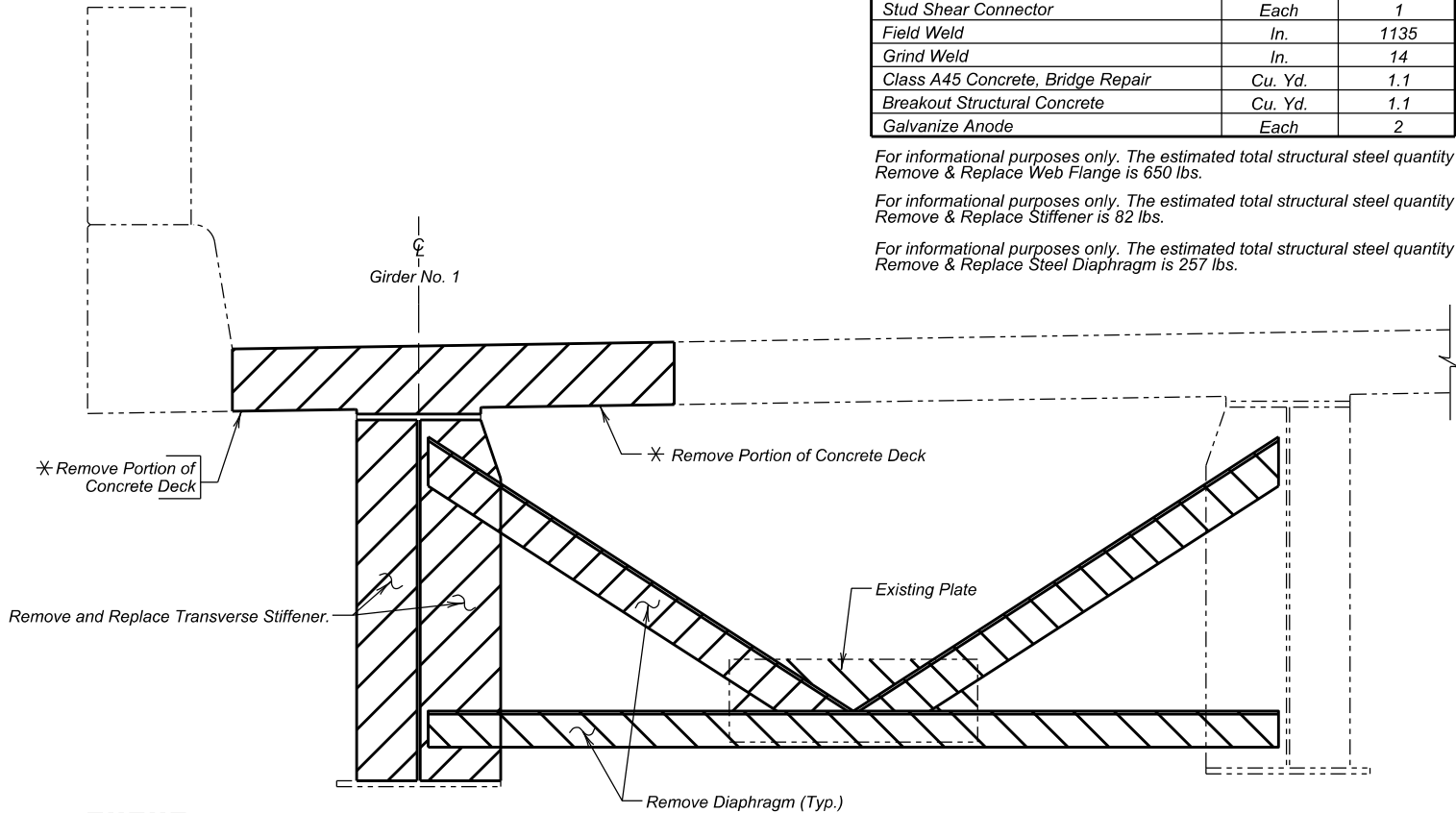
DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove & Replace Web and Flange	Each	1
Remove & Replace Transverse Stiffener	Each	6
Remove & Replace Steel Diaphragm	Each	1
Stud Shear Connector	Each	1
Field Weld	In.	1135
Grind Weld	In.	14
Class A45 Concrete, Bridge Repair	Cu. Yd.	1.1
Breakout Structural Concrete	Cu. Yd.	1.1
Galvanize Anode	Each	2

For informational purposes only. The estimated total structural steel quantity for Remove & Replace Web Flange is 650 lbs.

For informational purposes only. The estimated total structural steel quantity for Remove & Replace Stiffener is 82 lbs.

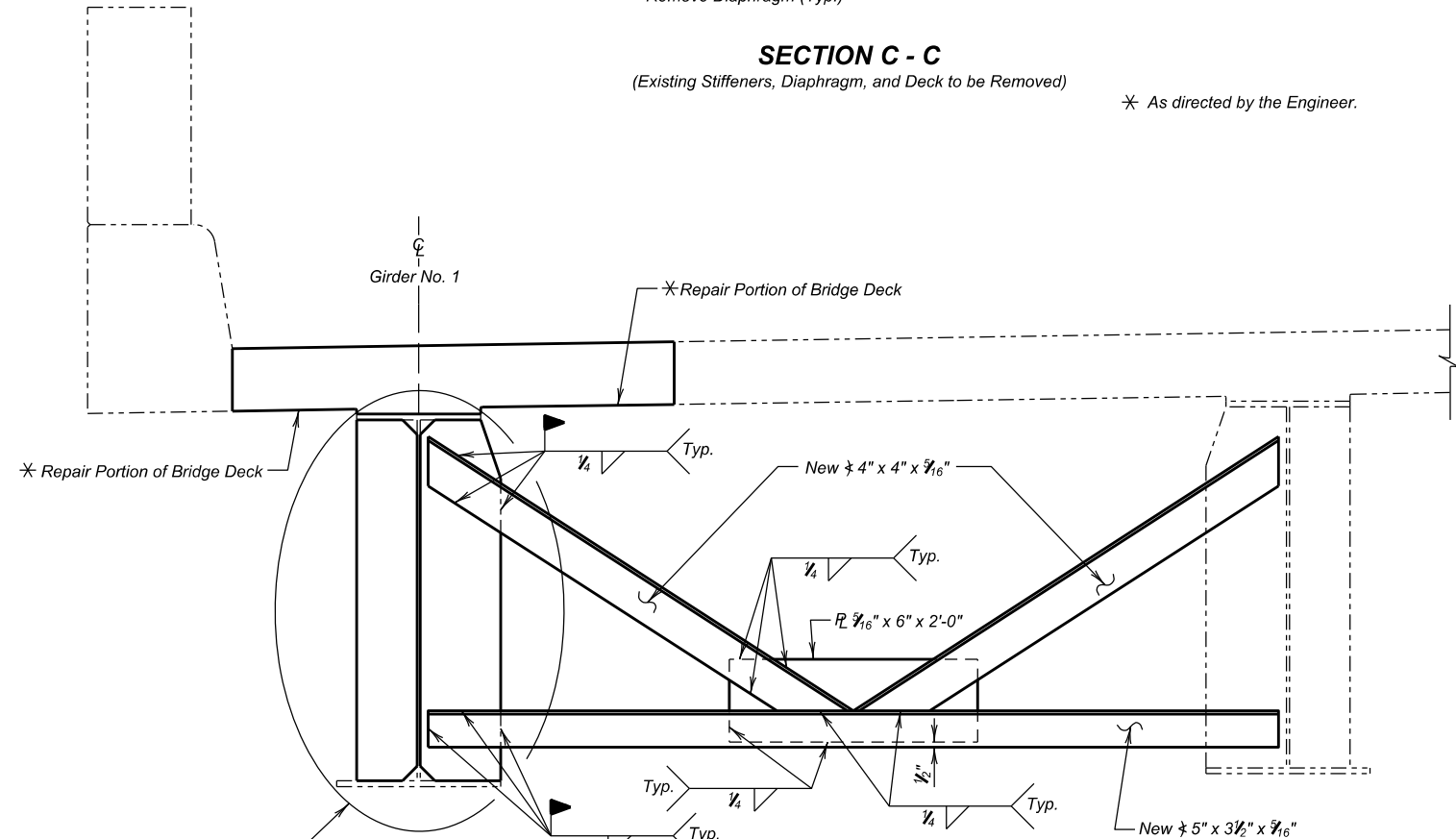
For informational purposes only. The estimated total structural steel quantity for Remove & Replace Steel Diaphragm is 257 lbs.



SECTION C - C

(Existing Stiffeners, Diaphragm, and Deck to be Removed)

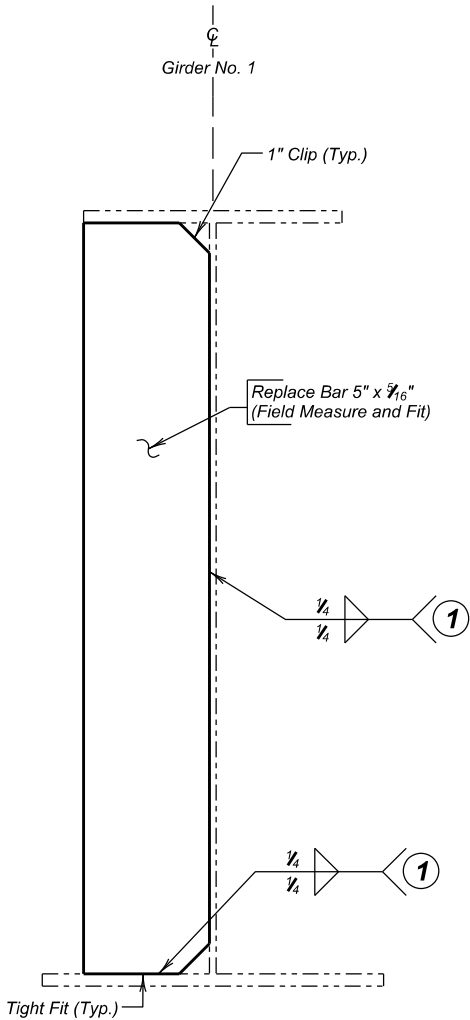
* As directed by the Engineer.



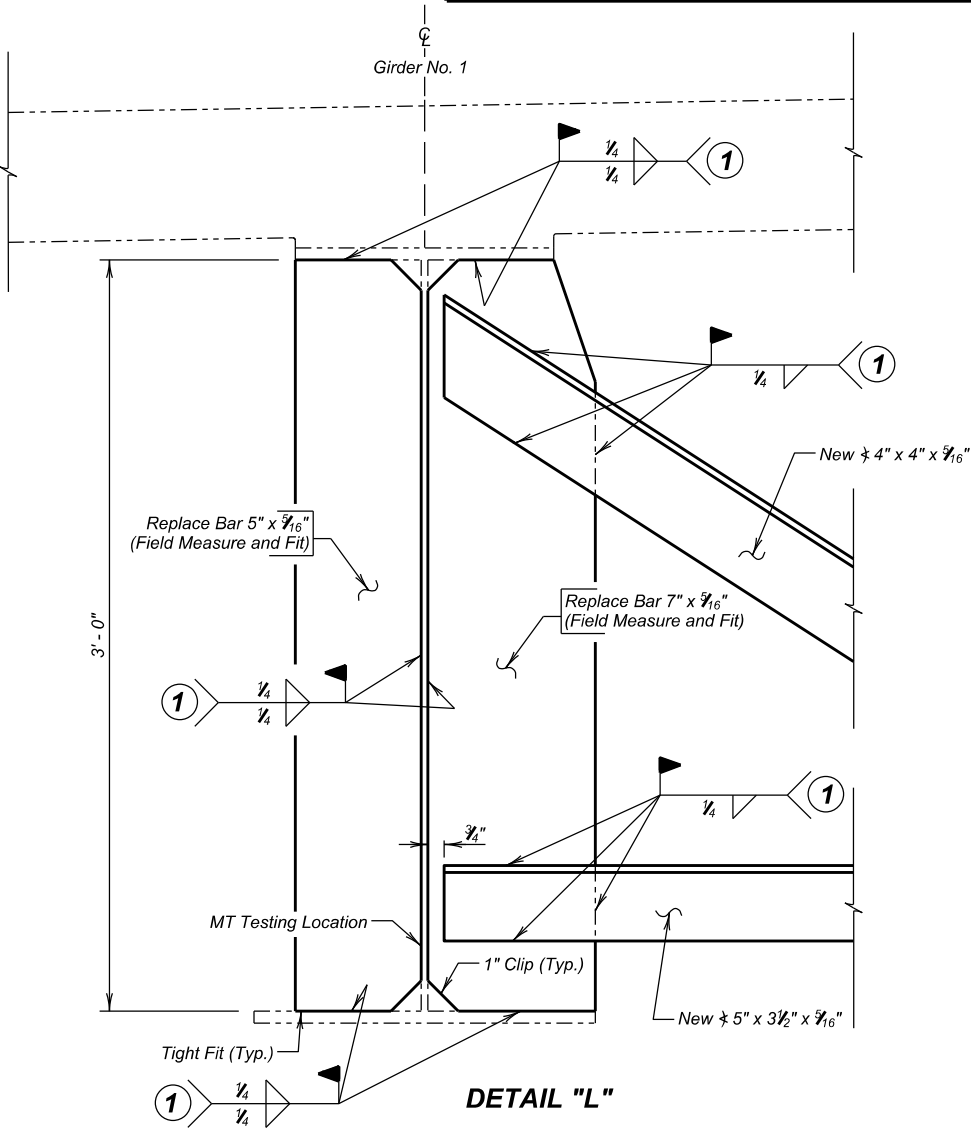
SECTION C - C

(New Stiffeners, Diaphragm, and Deck)

Area to be Removed



DETAIL "P"



DETAIL "L"

1 All fillet welds attaching web to flange and stiffeners to girder flanges and webs shall terminate 1/2" from edge of stiffener, flange, stiffener clip or cope, whichever is applicable.

GIRDER NO. 1 REPAIR DETAILS (D)

FOR

254' - 0" CONT. COMP. GIRDER BRIDGE

30' - 0" ROADWAY

OVER I90

STR. NO. 08-310-135

0° SKEW

SEC. 9/10-T103N-R67W

090 E-288

BRULE COUNTY

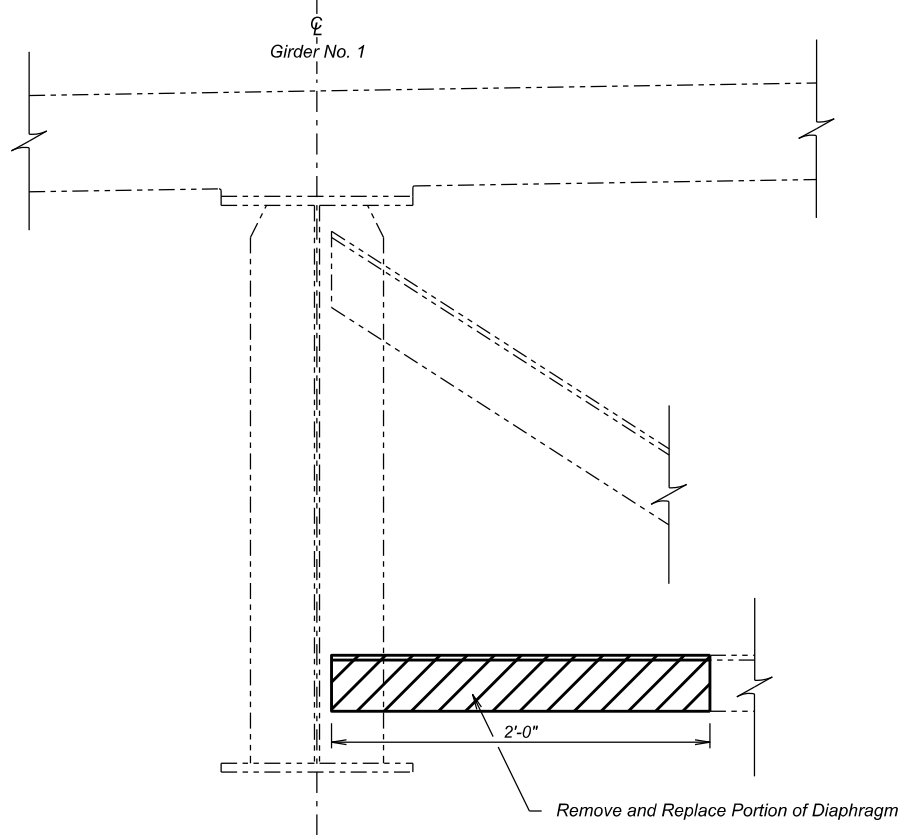
S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2020

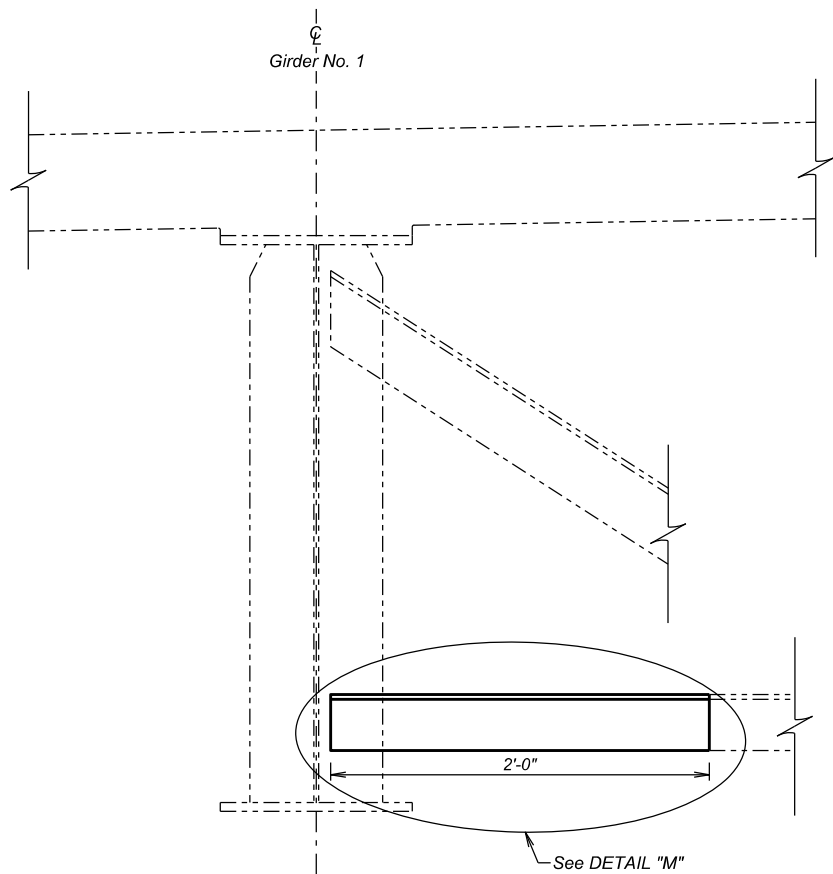
12 OF 20

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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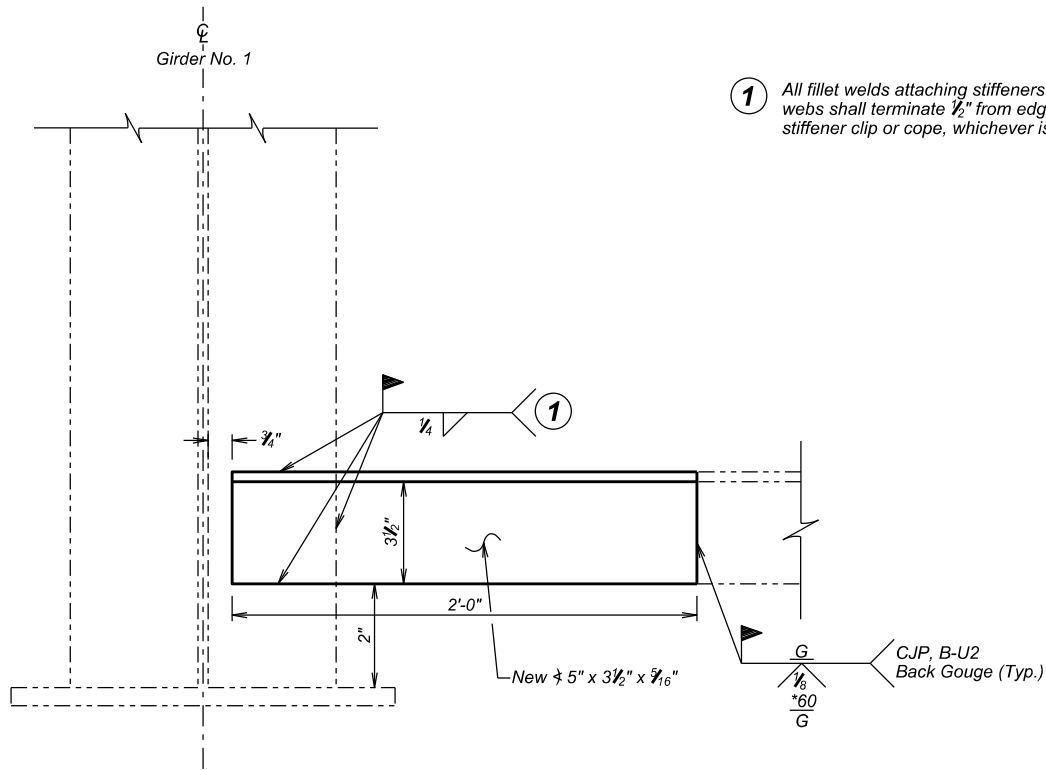
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090 E-288	17	42



SECTION D - D
(Existing Stiffeners, and Diaphragm)



SECTION D - D
(New Portion of Diaphragm)



DETAIL "M"
(New Partial Diaphragm)

1 All fillet welds attaching stiffeners to girder flanges and webs shall terminate 1/2" from edge of stiffener, flange, stiffener clip or cope, whichever is applicable.

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Repair Steel Diaphragm	Each	1
Field Weld	In.	22

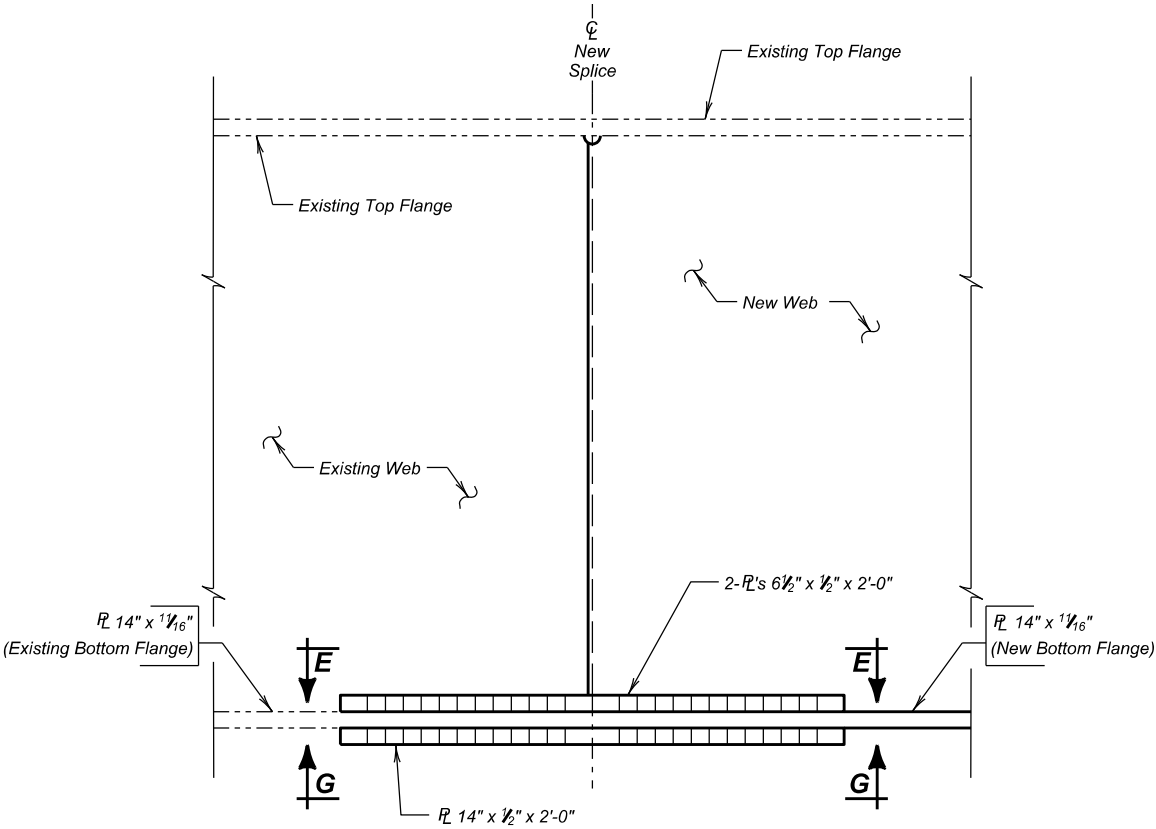
For informational purposes only. The estimated total structural steel quantity for Repair Steel Diaphragm is 18 lbs.

GIRDER NO. 1 REPAIR DETAILS (E)
FOR
254' - 0" CONT. COMP. GIRDER BRIDGE
30' - 0" ROADWAY 0° SKEW
OVER I90 SEC. 9/10-T103N-R67W
STR. NO. 08-310-135 090 E-288

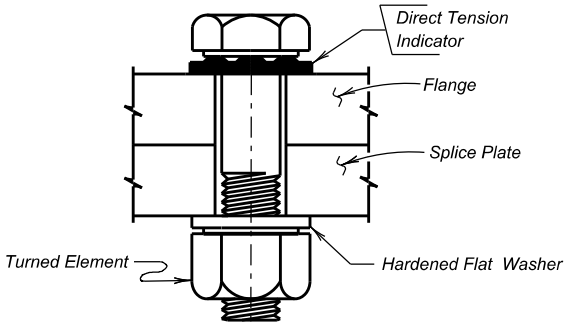
BRULE COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2020

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	
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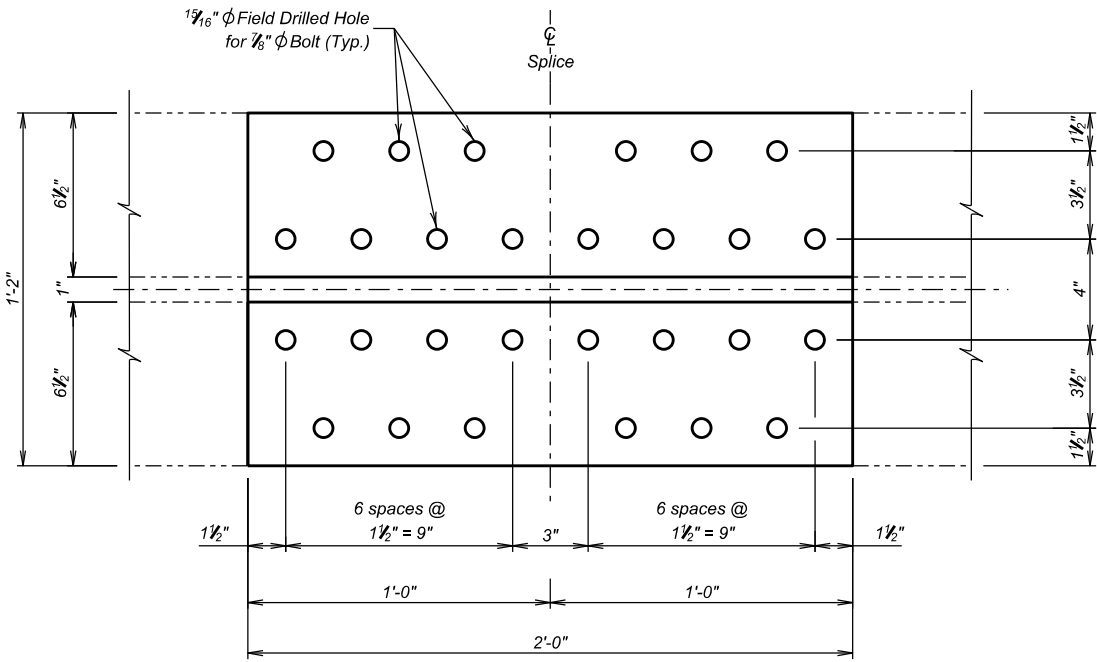
BRIDGE ENGINEER



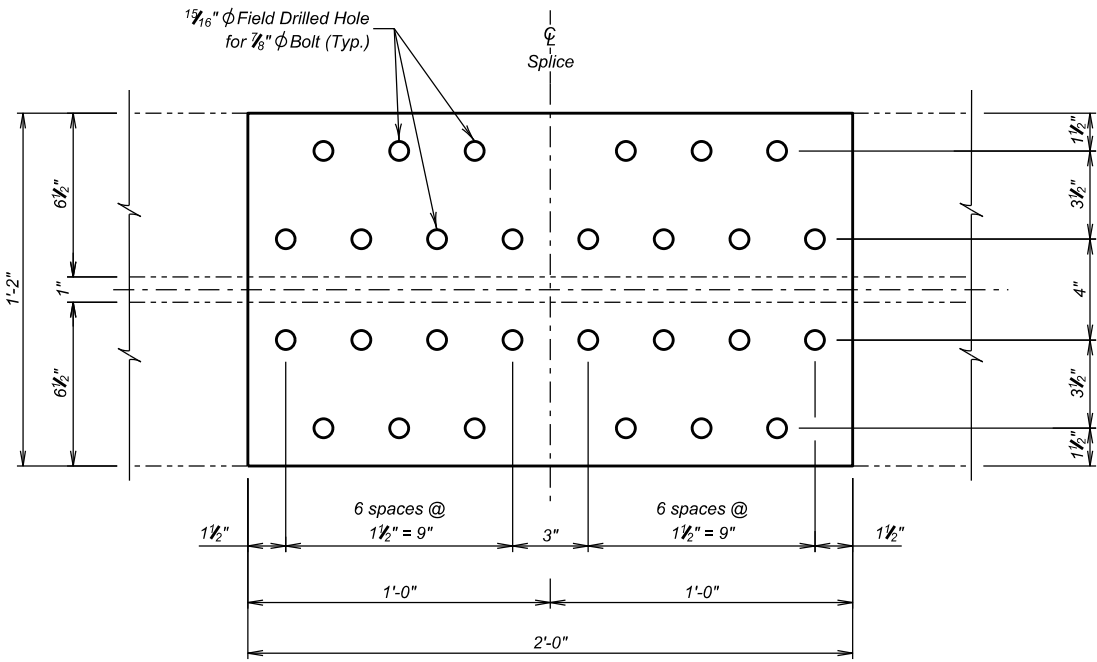
NEW BOTTOM FLANGE BOLTED SPLICE DETAIL
ELEVATION ~ EXTERIOR GIRDER



DIRECT TENSION INDICATOR
DETAIL



VIEW E - E



VIEW G - G

NOTES:

All Bolts shall be 7/8" ϕ ASTM F3125 Grade A325 High Strength Bolts. See Direct Tension indicator Details on this sheet.

For informational purposes only, the estimated total structural steel quantity for Bolted Field Splice including plates, bolts, nuts, and washers is 124 lbs each.

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Bolted Girder Splice	Each	2

BOLTED SPLICE REPAIR DETAILS (A)

FOR

254' - 0" CONT. COMP. GIRDER BRIDGE

30' - 0" ROADWAY

OVER I90

STR. NO. 08-310-135

0° SKEW

SEC. 9/10-T103N-R67W

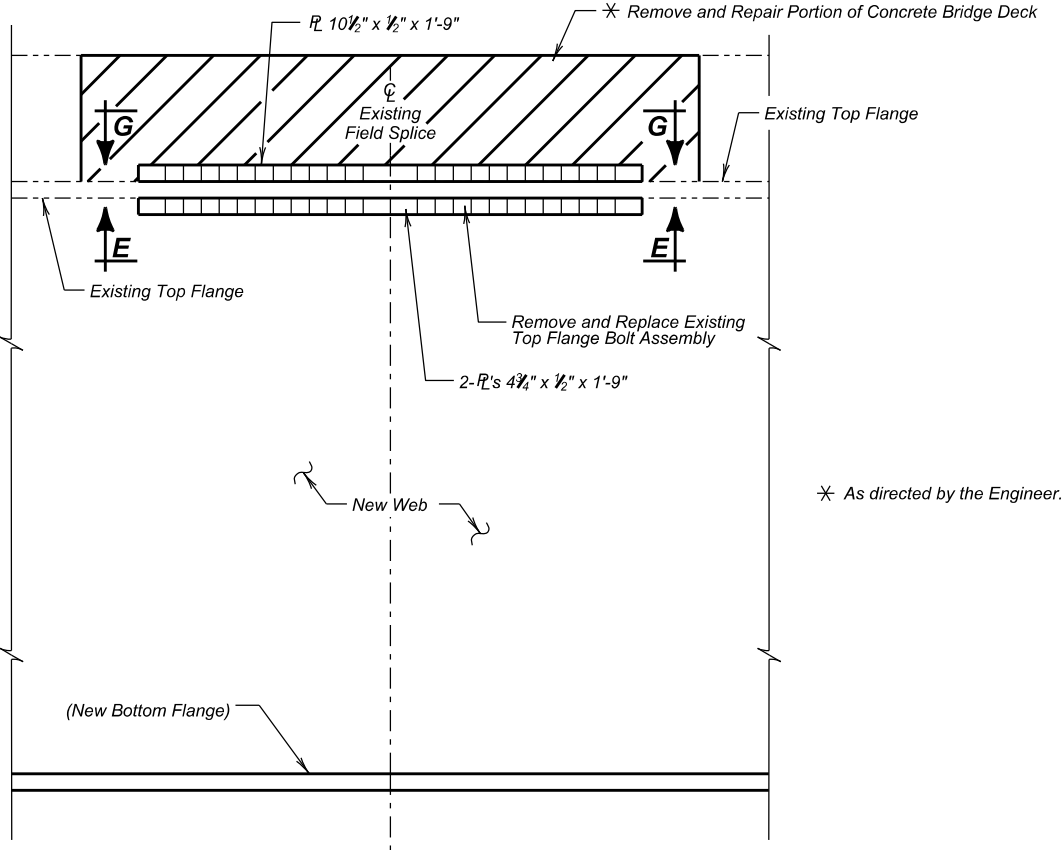
090 E-288

BRULE COUNTY
S. D. DEPT. OF TRANSPORTATION

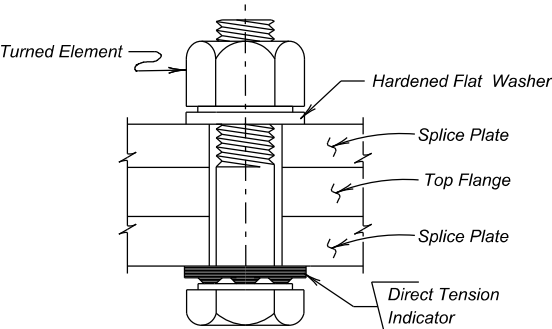
SEPTEMBER 2020

14 OF 20

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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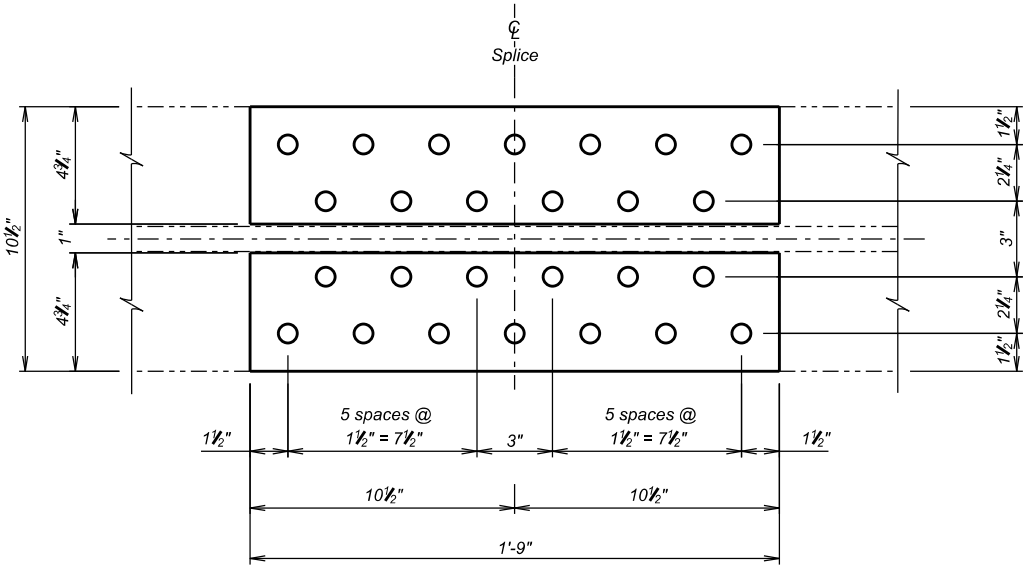
EXISTING TOP FLANGE BOLTED SPLICE DETAIL
ELEVATION ~ EXTERIOR GIRDER



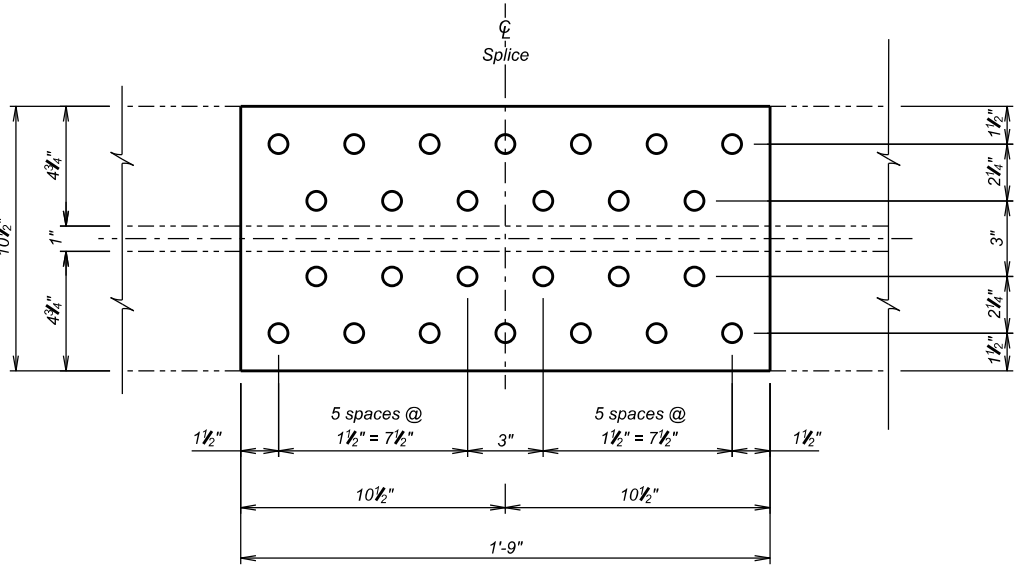
DIRECT TENSION INDICATOR
DETAIL

NOTES:

- Replace all bolts on top flange splice as indicated.
- No live load shall be on the bridge during bolt removal and replacement.
- Bolt removal and replacement will be paid for as Remove and Replace Bolt Assembly.
- Bolts, nuts, and washers shall conform to ASTM F3125, Grade A325.
- Bolts in flange splices shall be placed with the heads down.
- For informational purposes only, the estimated total structural steel quantity for Remove and Replace Bolt Assembly including plates, bolts, nuts, and washers is 85 lbs each.



VIEW E - E

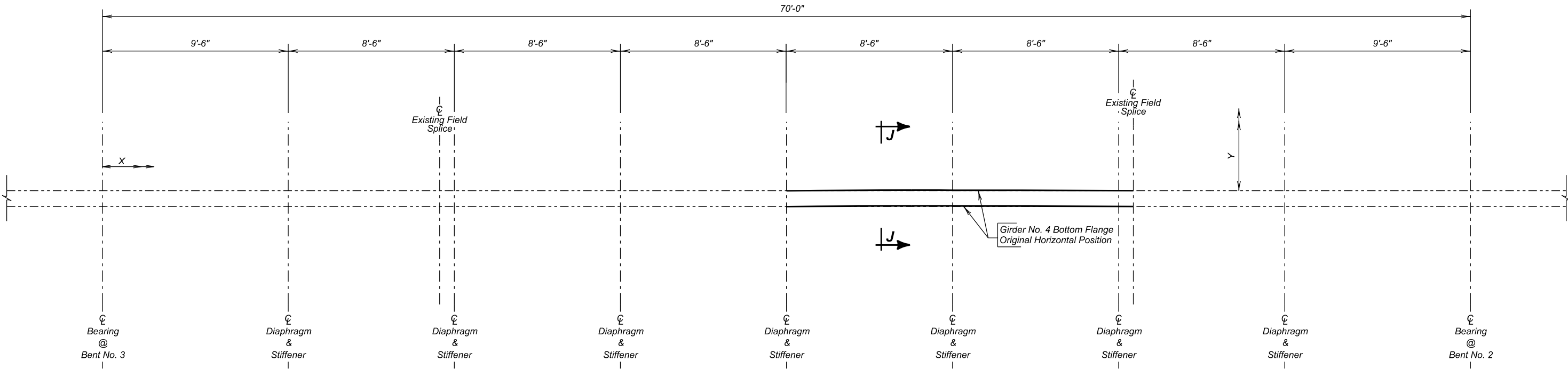
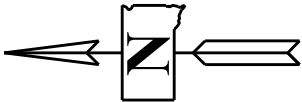


VIEW G - G

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove and Replace Bolt Assembly	Each	1
Breakout Structural Concrete	Cu. Yd.	0.1
Class A45 Concrete, Bridge Repair	Cu. Yd.	0.1
Galvanize Anode	Each	1

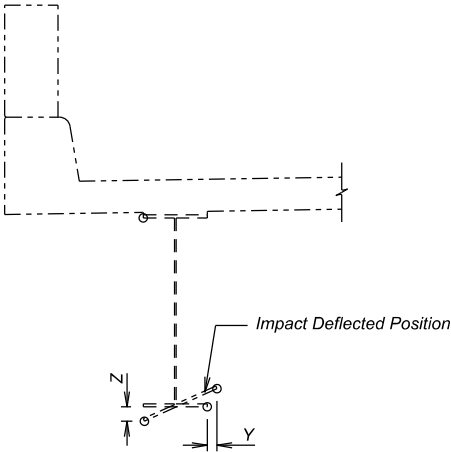
BOLTED SPLICE REPAIR DETAILS (B)
FOR
254' - 0" CONT. COMP. GIRDER BRIDGE
30' - 0" ROADWAY
OVER I90
STR. NO. 08-310-135
0° SKEW
SEC. 9/10-T103N-R67W
090 E-288

BRULE COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2020



GIRDER NO. 4 - BOTTOM FLANGE

NOTE:
Heat Straighten Girder No. 4 Bottom Flange, See Notes.



SECTION J-J

(Shown at X Measurements)

GIRDER NO. 4 HORIZONTAL IMPACTS DEFLECTED POSITION MEASUREMENTS	
X	Y
35'-0"	0"
41'-4 ³ / ₄ "	1/2"
52'-9"	0"

GIRDER NO. 4 VERTICAL IMPACTS DEFLECTED POSITION MEASUREMENTS	
X	Z
35'-0"	0"
41'-4 ³ / ₄ "	1/2"
52'-9"	0"

GIRDER NO. 4 REPAIR DETAILS
FOR
254' - 0" CONT. COMP. GIRDER BRIDGE
30' - 0" ROADWAY
OVER I90
STR. NO. 08-310-135
0° SKEW
SEC. 9/10-T103N-R67W
090 E-288

BRULE COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2020

INDEX OF BRIDGE SHEETS —

Sheet No. 1 - General Drawing and Quantities.
 Sheet No. 2 - Subsurface Investigations.
 Sheet No. 3 - Erection Data.
 Sheet No. 4 - Details for Std. Reinf. Conc. Sill. N4-WP-252-30
 Sheet No. 5 - Details for Std. Reinf. Conc. Bent. CB-252-30-00 (8-30-62)
 Sheet No. 6 - Superstructure Details N4 CWG-252-30-00-1-3 (6-27-62)
 Sheet No. 7 - Superstructure Details N4 CWG-252-30-00-2-3
 Sheet No. 8 - Superstructure Details N4 CWG-252-30-00-3-3 (8-30-62)
 Sheet No. 9 - Standard Railing and Drain Details N4-R-252-30-00-4-3 (8-30-62)
 Sheet No. 10 - Details of Bolted Field Splice. CWG-252-30-B5

B.M. No. 15 El. 1688.15
 Iron pin in fence line
 500' Lt. Sta. 273+33

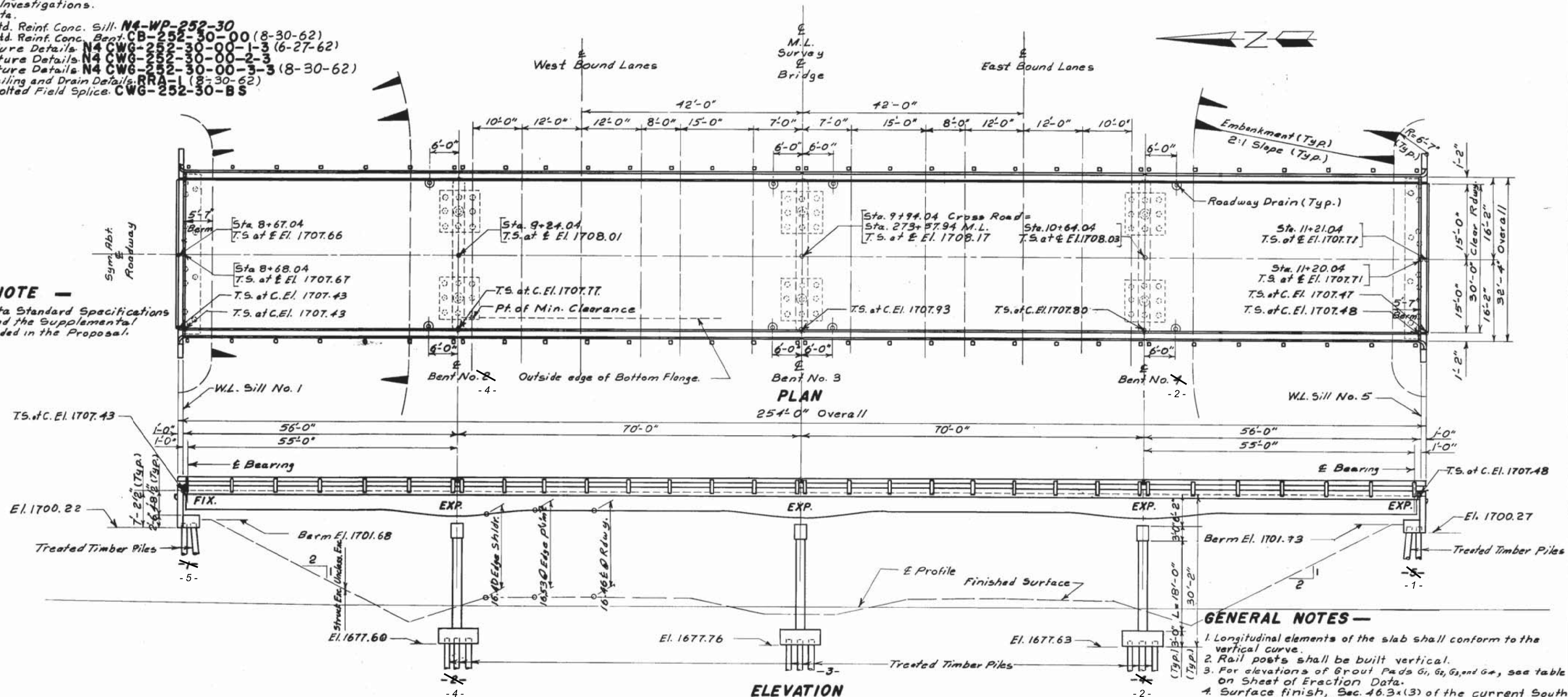
NOTE:
 T.S. @ E.L. = Top of Slab at Centerline Roadway Elevation.
 T.S. @ C.E.L. = Top of Slab at Curb Elevation.

B.M. No. 13 A El. 1683.54
 Iron pin in concrete
 400' Rt. Sta. 273+33

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090 E-288	21	42

SPECIFICATION NOTE —

Use current South Dakota Standard Specifications for Roads and Bridges, and the Supplemental Specifications as included in the Proposal.



GENERAL NOTES —

1. Longitudinal elements of the slab shall conform to the vertical curve.
2. Rail posts shall be built vertical.
3. For elevations of Grout Pads G1, G2, G3, and G4, see table on Sheet of Erection Data.
4. Surface finish, Sec. 46.3(3) of the current South Dakota Standard Specifications, shall also include such portions of the structure which are visible from any traveled lane.
5. Place roadway drains as shown in PLAN (8-Reg'd)

ORIGINAL CONSTRUCTION PLANS

STR. NO. 08-310-135

GENERAL DRAWING AND QUANTITIES

FOR

254'-0" CONT. COMP. GIRDER VIADUCT

30'-0" ROADWAY

OVER I.S. NO. 90 STA. 273+57.94 SEC. 9/10-T103N-R67W

STA. 8+67.04 TO 11+21.04

I 90-6(II)289

Str. No. 08-310-135

BRULE COUNTY

SOUTH DAKOTA

H20-S16-44

DEPARTMENT OF HIGHWAYS

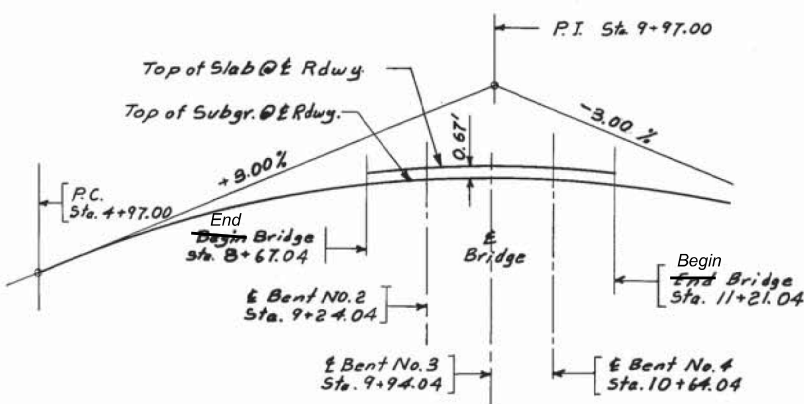
OCT. 1962

(17) OF (20)

-X771-

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
	R.K.	L.G. & H.A.	<i>[Signature]</i> BRIDGE ENGINEER

P.I. Sta. 9+97.00
 El. 1715.00
 V.C. 1000'

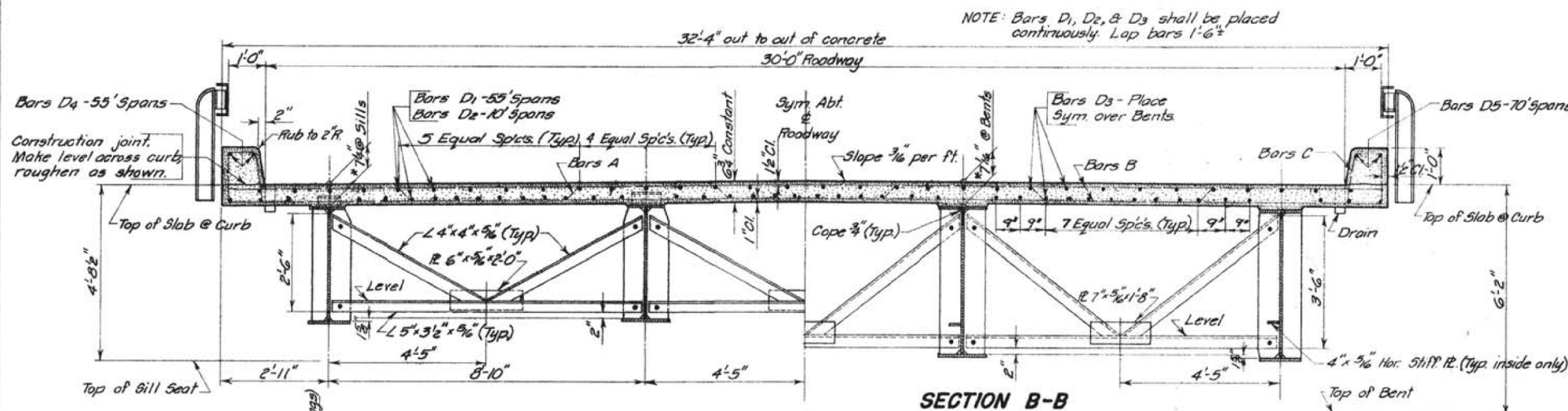
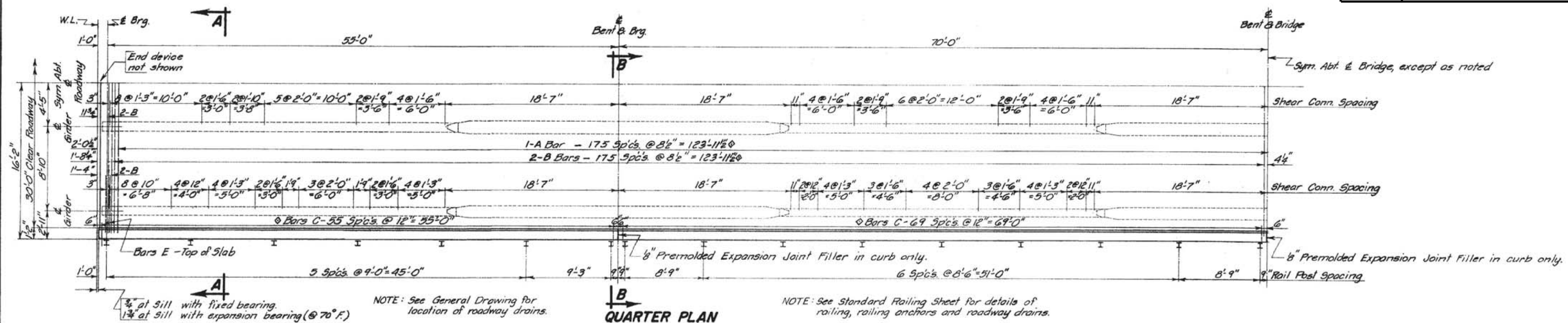


SUBGRADE CURVE DATA

ESTIMATED QUANTITIES									
ITEM	CL "A" Conc. Cu. Yds.	Steel - lbs.	Type "A" Steel Railing Lin. Ft.	Timber Piles - Lin. Ft.	Excavation - Cu. Yds.	Grout Pads	Grout Pads	Grout Pads	Grout Pads
Superstr. - 252'-0" Cont. Comp. Unit	91.8	58,830	132,730	510.3					
Substr. - Sill No. 1	23.2	2,205	845						
Substr. - Bent No. 2, 3, and 4	87.9	20,270							
Substr. - Sill No. 5	23.2	2,205	845						
Totals	325.2	83,510	34,105	510.3					

All Unclassified Excavations to be done by others.
 One Treated Timber Test Pile shall be driven at Sill No. 1 and 5 and Bent No. 2, 3, and 4 before remaining piles are ordered.
 PILE NOTE: Piles driven at Sills No. 1 and 5, including Test Piles, shall obtain their full bearing (24 Tons) in the natural ground below the new embankments, elevations 1685.7± and 1685.1± respectively. Pre-bored holes thru the fill are required, and shall have a minimum diameter 2" larger than the nominal diameter (3" from the butt) of the pile.

ITEM	CL "A" Conc. Cu. Yds.	Steel - lbs.	Type "A" Steel Railing Lin. Ft.	Timber Piles - Lin. Ft.	Excavation - Cu. Yds.	Grout Pads	Grout Pads	Grout Pads	Grout Pads
Superstr. - 252'-0" Cont. Comp. Unit	91.8	58,830	132,730	510.3					
Substr. - Sill No. 1	23.2	2,205	845						
Substr. - Bent No. 2, 3, and 4	87.9	20,270							
Substr. - Sill No. 5	23.2	2,205	845						
Totals	325.2	83,510	34,105	510.3					



REINFORCING SCHEDULE					
Mk.	No.	Size	Length	Type	Bending Details
A	551	5	33'-0"	15	
B	712	5	32'-0"	Str.	
C	504	4	5'-3"	T1	
D ₁	143	5	37'-0"	Str.	
D ₂	148	5	33'-0"	Str.	
D ₃	222	5	40'-0"	Str.	
D ₄	16	5	28'-9"	Str.	
D ₅	16	5	35'-9"	Str.	
E	8	6	6'-0"	Str.	

NOTE: All dimensions are out to out of bars.

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Class II Concrete	Cu. Yds.	191.8
Reinforcing Steel	Lbs.	58,830
Structural Steel	Lbs.	136,730
Type RPA-1 Steel Railing	Lt. Ft.	510.3

Applies only if fixed bearings are at Sill #1 or Sill #5. If fixed bearings are located on any of the bents, deduct 165 lbs. from this quantity. See General Drawing for location of fixed bearings.

ORIGINAL CONSTRUCTION PLANS

STR. NO. 08-310-135

SUPERSTRUCTURE DETAILS

FOR

STANDARD 252'-0" CONTINUOUS WELDED PLATE GIRDER UNIT

COMPOSITE SECTION

30'-0" ROADWAY

4-SPAN UNIT

SOUTH DAKOTA

DEPARTMENT OF HIGHWAYS

AUG. 1961

18 OF 20

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED

Re-Steel Revised 6-27-62

N4 CWG-252-30-00-1-3

CHANNEL SHEAR CONNECTOR

WELDED STUD SHEAR CONNECTORS

DETAILS FOR SHEAR CONNECTORS

Channel or welded stud shear connectors are spaced as shown above in Quarter Plan. The Contractor may substitute a row of 3/8" welded studs for each channel shear connector as shown. Shear connectors will be paid for as structural steel based on the weight of channels, regardless of type of connector used. Channels shall be placed on the girders facing in the directions as shown on Girder Layout.

CONCRETE PLACING NOTES—

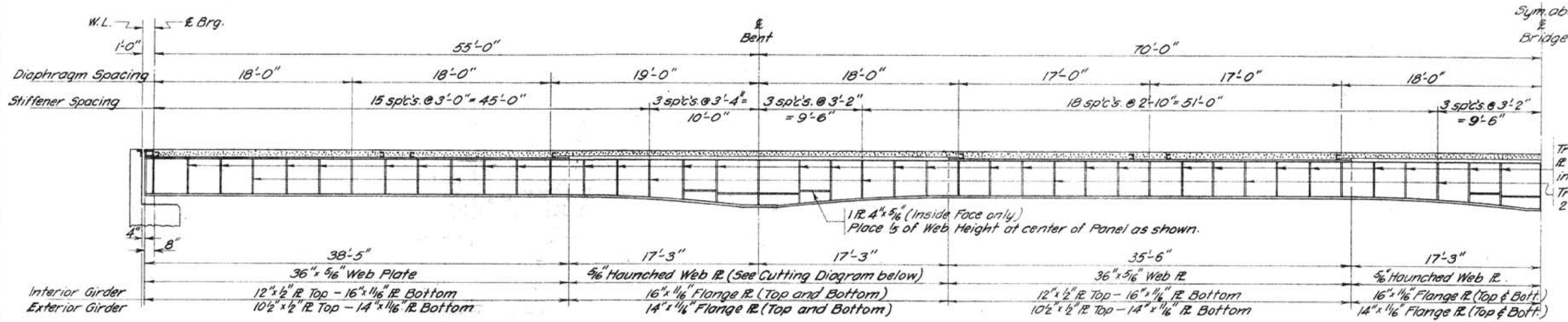
The concrete slab may be placed in one continuous pour. However, if the Contractor deems it advisable to use construction joints, a plan showing type of joint and pouring procedure, shall be submitted to the BRIDGE DIVISION for approval. The curb shall be poured after all of the slab has been poured.

SECTION A-A

* Dimensions at E of Bearings. At interior points, dimensions must be corrected according to the D.L. Deflection Diagram and Note.

DETAIL "X"

DIAPHRAGMS



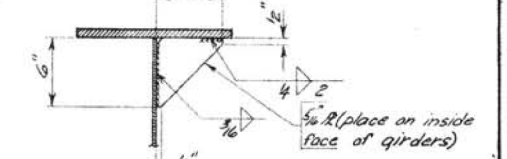
NOTE: When stiffener plates are used on one side only they shall be attached to the outstanding leg of the compression flange as shown in Detail "Y".

DETAIL "Y"

Transv. Interm. Stiff. R 5"x5/8" Place on inside face only.

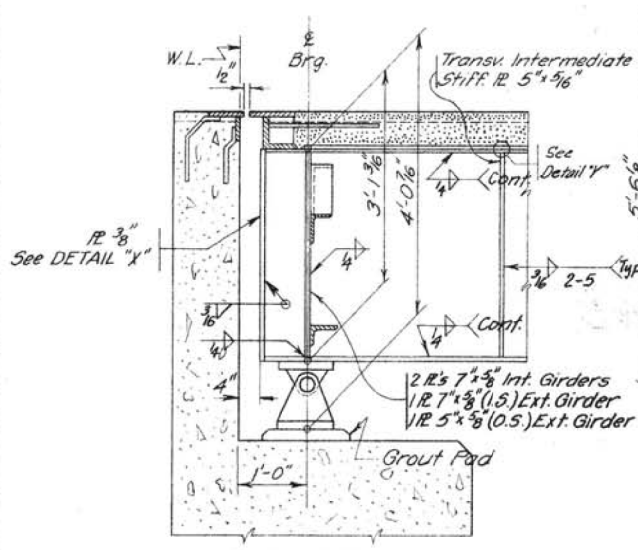
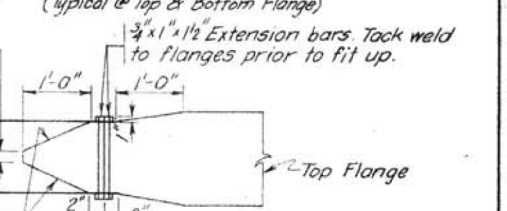
Transv. Interm. Stiff. 2-R 5"x5/8".

Bottom Flange shall be considered compression flange at haunched section between field splices. Top flange shall be considered compression flange in all other sections.

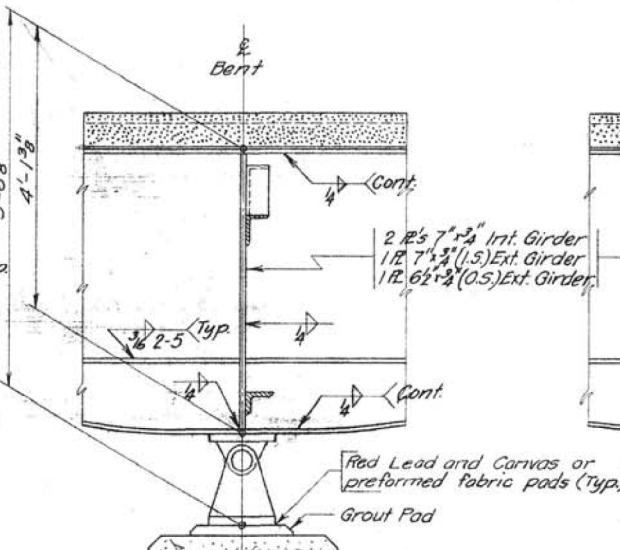


DETAIL "D"

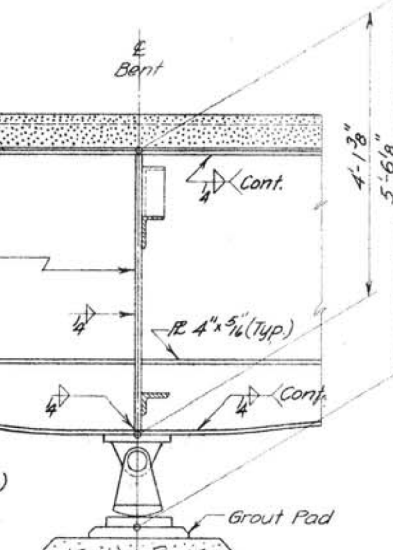
NOTE: Other transverse stiffeners are as noted in Sections below and as detailed on Rdwy. Section.



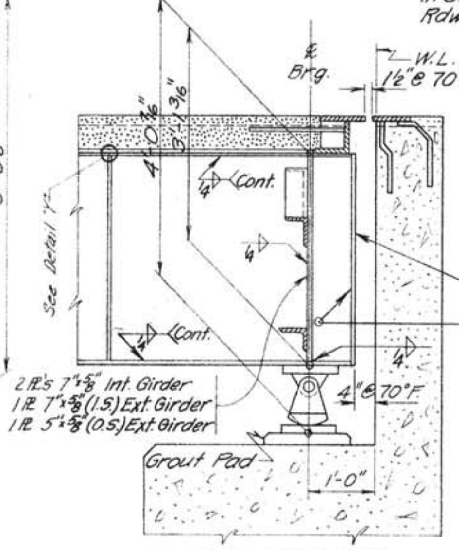
**SILL SECTION
FIXED SHOE**



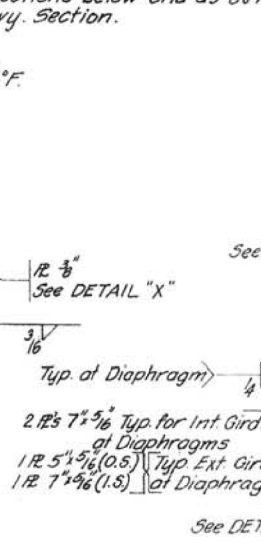
**BENT SECTION
FIXED SHOE**



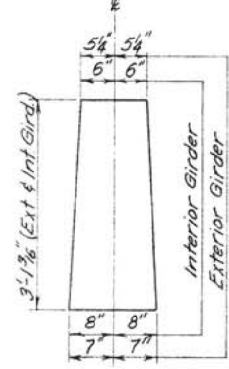
**BENT SECTION
ROCKER SHOE**



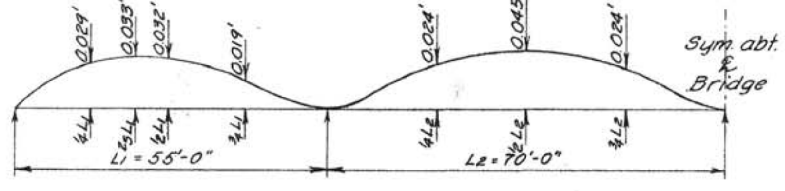
**SILL SECTION
ROCKER SHOE**



TYPICAL FIELD SPLICE



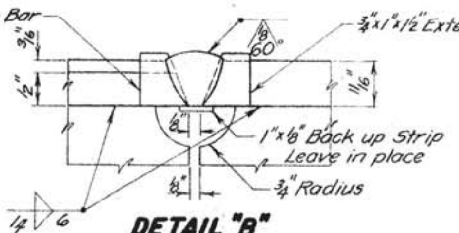
DETAIL "X"
END PLATE



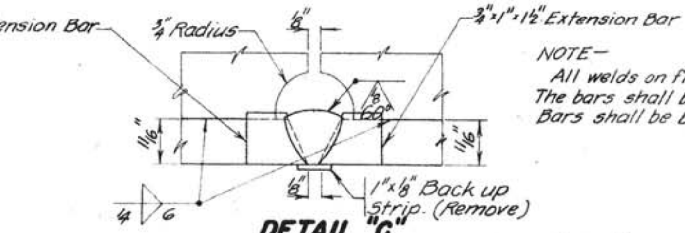
D.L. DEFLECTION DIAGRAM

NOTE—

The D.L. Deflection Diagram shown shall be used to determine the depth of haunch required at Interior Points. Elevations at top of Girders shall be established after the Girders, with diaphragms, have been erected and welded, but prior to pouring of Slab. Girders shall not be supported by construction shoring while elevations are established. The depth of haunch required at any interior point equals (+) the proposed top of slab minus (-) the elevation of top of Girder, minus (-) slab thickness (6 3/4") plus (+) Dead Load Deflection.



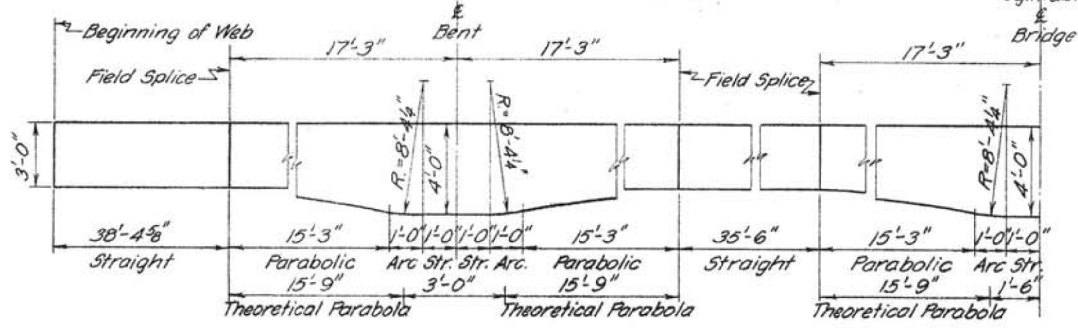
DETAIL "B"



DETAIL "C"

NOTE—

All welds on flange shall start and stop on Extension Bars. The bars shall be of mild steel. After weld is completed, Extension Bars shall be burned off flush.



WEB CUTTING DIAGRAM

ORIGINAL CONSTRUCTION PLANS
STR. NO. 08-310-135

SUPERSTRUCTURE DETAILS
FOR
**STANDARD 252'-0" CONTINUOUS
WELDED PLATE GIRDER UNIT**

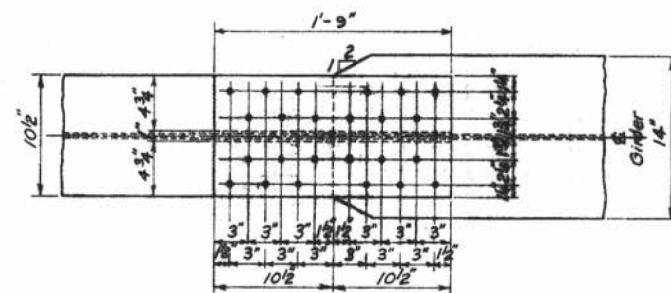
COMPOSITE SECTION
30'-0" ROADWAY 4 SPAN UNIT

SOUTH DAKOTA
DEPARTMENT OF HIGHWAYS

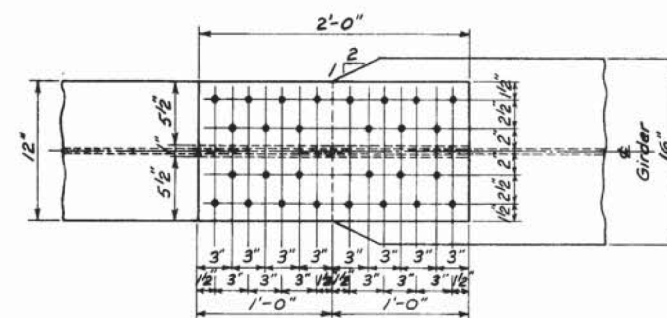
AUG. 1961 19 OF 20

DESIGNED BY	DTS	CHECKED BY	B.D.M.	APPROVED	W. Schmitt
				BRIDGE ENGINEER	

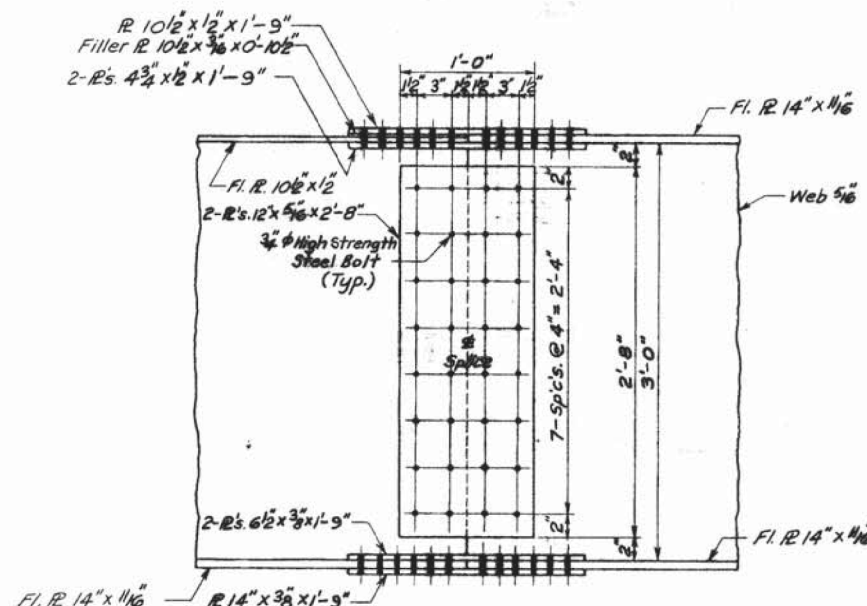
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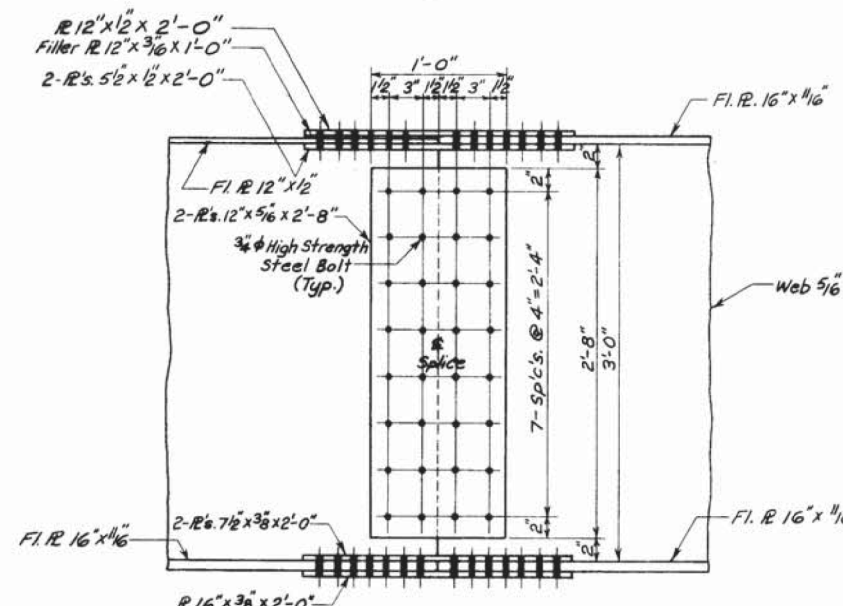
TOP VIEW



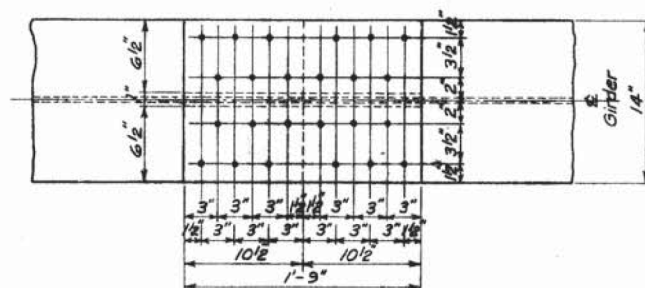
TOP VIEW



ELEVATION OF SPLICE

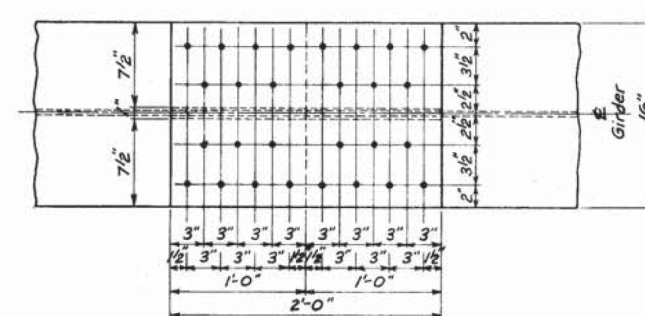


ELEVATION OF SPLICE



BOTTOM VIEW

TYPICAL BOLTED SPLICE
EXTERIOR GIRDER



BOTTOM VIEW

TYPICAL BOLTED SPLICE
INTERIOR GIRDER

GENERAL NOTES—

- All bolts shall be 3/4" ϕ high-strength (A.S.T.M. A325) with two hardened washers.
- Holes for 3/4" ϕ high-strength bolts shall be subpunched reamed and splice plates match-marked after assembling as provided in Section 41.3 of South Dakota Standard Specifications for Roads and Bridges.
- Steel for splice plates and fill plates shall conform to A.S.T.M. A7 structural carbon steel, or A.S.T.M. A373 steel for welding.
- 3/4" ϕ high-strength bolts shall be tightened to a minimum tension of 28,400 lbs. Tightening shall be done with properly calibrated wrenches or by the "turn-of-nut" method as provided in Section 41.3 nnn of South Dakota Standard Specifications for Roads and Bridges.
- All bolts in flange splices shall be placed with head down.
- Bolts in web splices of exterior girders shall be placed with heads on exterior face of girders.
- Triangular plates shown welded to flange and web near girder ends at welded splices shall be omitted when bolted splices are used.
- Clip ends of intermediate stiffeners, if necessary, to clear flange splice plates.
- If an intermediate stiffener is located in area of web splice plate, the intermediate stiffener may be shifted to clear.
- If shear connectors are located in area of flange splice plates, shear connectors may be shifted and re-spaced to clear.
- Any re-spacing or shifting of intermediate stiffeners and/or shear connectors shall be noted on the shop Plans for approval by the ENGINEER.
- When the Contractor elects to use the alternate bolted splice, the weight of necessary bolts and plates will not be measured for payment. See Special Provisions.

ORIGINAL CONSTRUCTION PLANS

STR. NO. 08-310-135

DETAILS OF BOLTED FIELD SPLICE

FOR

STANDARD 252'-0" CONTINUOUS WELDED PLATE GIRDER UNIT

COMPOSITE SECTION

30'-0" ROADWAY

4-SPAN UNIT

SOUTH DAKOTA H20-S16-44

DEPARTMENT OF HIGHWAYS

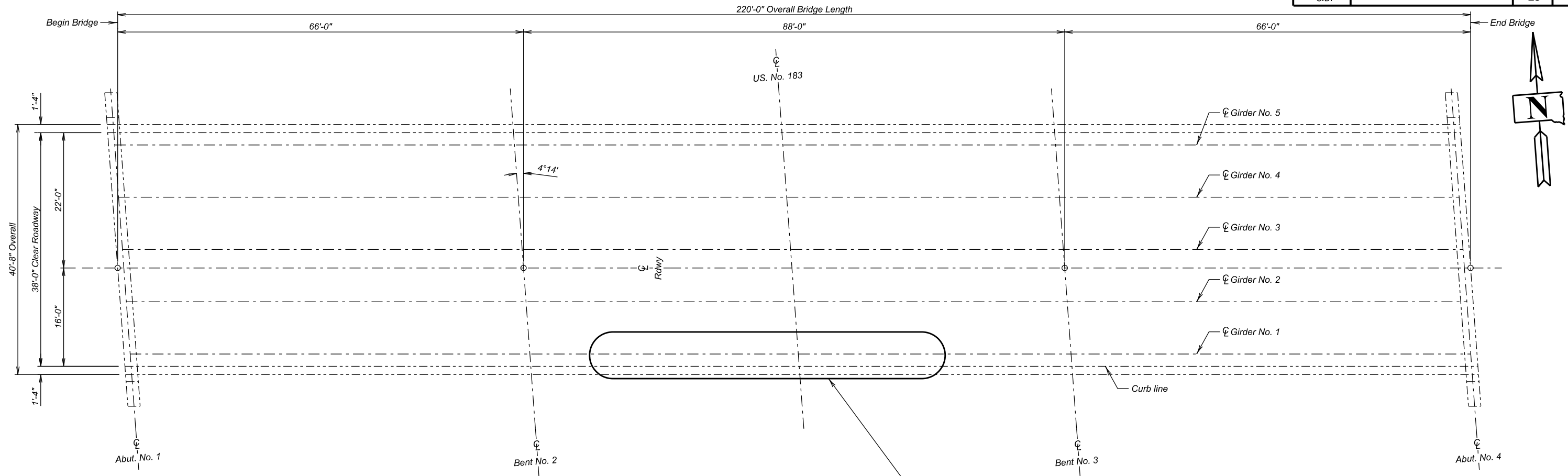
SEPTEMBER 1962

20 OF 20

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
	KMM	ASF	<i>[Signature]</i>

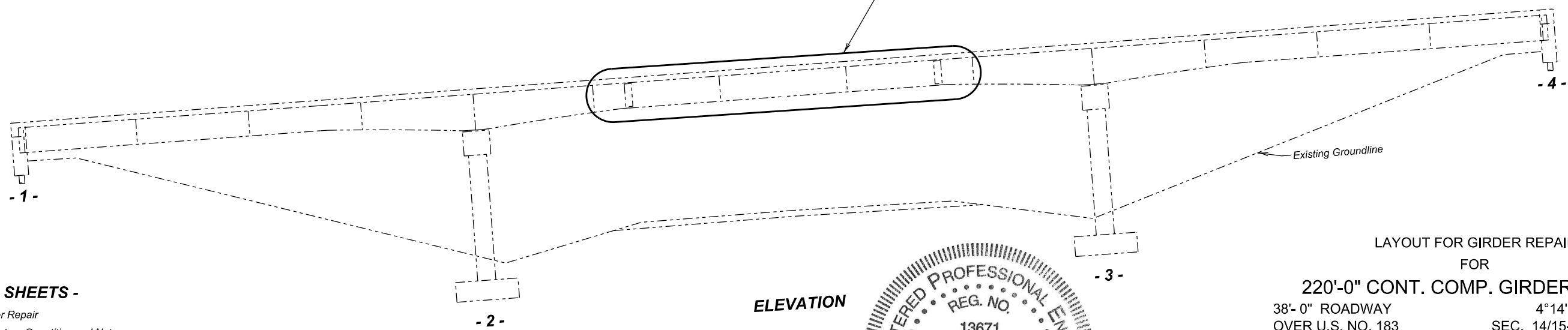
BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090 W-368	25	42



PLAN

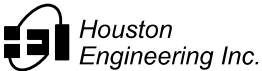
Approximate locations of damaged girder, diaphragms, & stiffeners
See Girder No. 1 Repair Details Sheets



ELEVATION

INDEX OF BRIDGE SHEETS -

- Sheet No. 1 - Layout for Girder Repair
- Sheet No. 2 - Estimate of Structure Quantities and Notes
- Sheet Nos. 3 thru 7 - Notes (Continued)
- Sheet No. 8 - Girder No. 1 Repair Details (A)
- Sheet No. 9 - Girder No. 1 Repair Details (B)
- Sheet No. 10 - Girder No. 1 Repair Details (C)
- Sheet No. 11 - Girder No. 1 Repair Details (D)
- Sheet No. 12 - Girder No. 1 Repair Details (E)
- Sheet Nos. 13 thru 15 - Original Construction Plans



LAYOUT FOR GIRDER REPAIR
FOR
220'-0" CONT. COMP. GIRDER BRIDGE
38'-0" ROADWAY 4°14' SKEW R.H.F.
OVER U.S. NO. 183 SEC. 14/15-T105N-R77W
STR. NO. 43-160-205 090 W-368
PCN I63E
LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2020

-X271-

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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ESTIMATE OF STRUCTURE QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT	REMARKS
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS	
410E0350	Remove and Replace Web	2	Each	
410E0365	Remove and Replace Transverse Stiffener	4	Each	
410E0380	Remove and Replace Steel Diaphragm	1	Each	
410E0410	Stud Shear Connector	8	Each	See Special Provision
410E0508	Field Weld	858	In	
410E0512	Grind Weld	24	In	
410E0515	Drill Hole in Existing Steel	1	Each	
410E0520	Surface Grinding of Structural Steel	192	SqIn	
410E3010	Magnetic Particle Weld Inspection	6,124	In	
410E3020	Ultrasonic Weld Inspection	305	In	
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	5,184	SqIn	
412E0100	Bridge Repainting, Class I	Lump Sum	LS	
412E0500	Paint Residue Containment	Lump Sum	LS	
460E0070	Class A45 Concrete, Bridge Repair	0.3	CuYd	
460E0300	Breakout Structural Concrete	0.3	CuYd	
460E0650	Roadway Canopy	Lump Sum	LS	
460E8100	Repair Underside of Bridge Deck	4	SqFt	
480E5000	Galvanic Anode	6	Each	

SPECIFICATIONS

1. Design Specifications: AASHTO Standard Specifications for Highway Bridges 17th Edition using Load Factor Design.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications and Special Provisions as included in the Proposal.
3. All Welding and Welding Inspection shall be in conformance with the AASHTO/AWS Bridge Welding Code D1.5M/D1.5:2015 unless otherwise noted in this plan set.

PRE-CONSTRUCTION MEETING

A pre-construction meeting is required prior to beginning the repair work. The purpose of the meeting is to review the plans and procedures because of the specialty work involved. At a minimum, a representative from the Contractor and all Subcontractors shall attend this meeting along with Department personnel from the Area Office and Bridge Office. The contractor must notify the Bridge Construction Engineer and the Area Office at least five days prior to the meeting.

DETAILS AND DIMENSIONS OF EXISTING BRIDGE

All details and dimensions of the existing bridge, contained in these plans, are based on the original construction plans and shop plans and are provided as information only. It is the Contractor's responsibility to inspect and verify the actual field conditions and any necessary as-built dimensions affecting the satisfactory completion of the work required for this project.

SHOP PLANS

Shop plans shall be required as specified by Section 410.3A of the Construction Specifications.

GENERAL CONSTRUCTION

1. Welder certification shall be in accordance with Section 410.3D of the Construction Specifications.
2. The new steel web plates shall be ASTM A709 Gr. 36 T2. The new steel stiffener plates, and diaphragm plates shall be ASTM A709 Gr. 36.

NOTICE – LEAD BASED PAINT

Be advised that the paint on the steel surfaces of the existing structure is a paint containing lead. The Contractor should plan his/her operations accordingly and inform employees of the hazards of lead exposure.

SCOPE OF BRIDGE WORK

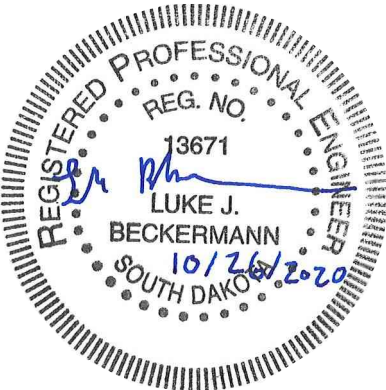
All work on this structure shall be accomplished under traffic with the traffic control as shown elsewhere in the plans.

1. Remove and capture all loose concrete on the underside of the bridge deck adjacent to Girder G1 to prevent any pieces from falling into traffic during the repair process. This shall not be done directly over traffic.
2. Identify and mark all yield lines, yielded zones, and surface nicks and gouges.
3. Grind surface nicks and gouges.
4. Clean and prepare area to be tested as specified by the Bridge Welding Code and these notes.
5. Nondestructive test fillet welds, crack tips and potential crack tips at the locations indicated in the plans.
6. Repair crack tips and weld flaws found by nondestructive testing prior to heat straightening. No heat straightening shall be performed until the nondestructive testing is complete and any necessary repairs are done for the member to be straightened.
7. Heat straighten damaged girder G1 including bottom flanges, web, and transverse stiffeners.
8. Perform nondestructive testing required after heat straightening and perform any repairs required.

9. Remove and replace the plan specified damaged stiffeners.
10. Remove and replace damaged web sections of girder G1.
11. Remove and replace the plan specified portion of diaphragm on girder G1.
12. Perform nondestructive testing required after repairs.
13. Repair crack tips, and weld flaws found by nondestructive testing after repairs.
14. Install canopy and breakout and repair portions of the bridge deck.
15. Prepare and paint work affected areas and new structural steel.

FIELD WELDING PROCEDURES

1. Approved Welding Procedure Specifications (WPS) will be required for this project, using the Shielded Metal Arc Welding (SMAW) process and an approved E7018 electrode from Table 4.1 of the Bridge Welding Code. The proposed WPSs for this project shall be submitted on Form O-2, from Annex O of the Bridge Welding Code, to the Bridge Construction Engineer for approval at least 2 weeks prior to construction.
2. Preparation of the base metal prior to welding shall be in accordance with Clause 3 of the Bridge Welding Code. Existing paint shall be removed a distance of 2 inches from each side of the weld.
3. Preheat will be required. Preheat and interpass temperature requirements shall be in accordance with Clause 4.2 of the Bridge Welding Code. The minimum pre-heat and interpass temperature shall be 320 degrees F for welds to the 1" and 1/2" girder flanges and 300 degrees F for welds to the 5/16" girder web as determined from Annex G of the Bridge Welding Code for high restraint conditions. Temperature indicating crayons shall be the minimum acceptable method for monitoring preheat and interpass temperatures.



ESTIMATE OF STRUCTURE QUANTITIES AND NOTES

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020

2 OF 15

DESIGNED BY: LJB	CK. DES. BY: JLM	DRAWN BY: KHC
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FIELD WELDING PROCEDURES (CONTINUED)

4. SMAW electrode atmospheric exposure requirements shall comply with Clause 4.5 of the Bridge Welding Code. Electrodes shall be purchased in hermetically sealed containers. If the container shows evidence of damage, the electrodes shall be dried in a drying oven for at least one hour at temperatures between 700 and 800 degrees F before they are used. Immediately after opening a hermetically sealed container or removal of the electrodes from a drying oven, electrodes shall be stored in ovens at a temperature of at least 250 degrees F. Electrodes exposed to the atmosphere upon removal from drying or storage ovens or hermetically sealed containers shall be used within four hours maximum or redried at 450 to 550 degrees F for two hours minimum. Electrodes exposed to the atmosphere for periods less than four hours may be returned to a storage oven and maintained at a minimum of 250 degrees F for a minimum of four hours before reissue. Electrodes shall be redried no more than one time. Electrodes which have been wet shall not be used.
5. All welds shall be cleaned in accordance with Clause 3.11 of the Bridge Welding Code. Completed welds and adjacent areas shall be cleaned of all weld splatter, slag, smoke and heat affected paint. No intermittent or “stitch” welds will be allowed.
6. E7018 electrodes shall be used for tack welds. The size of tack welds shall not be greater than 5/16”. Tack welds shall be positioned so they will be incorporated into, and re-melted by, the final weld. Tack welds shall be thoroughly cleaned prior to any weld placement.
7. Groove joint fit-up tolerances shall be +1/16”, -1/8” for root opening and +10°, -5° for the bevel angle for Joint Designation B-U2 as per Clause 3.3.4 of the Bridge Welding Code. The removal dimensions of the damaged web material and the dimensions of the new web plates shall be closely controlled to achieve the specified fit-up tolerances. All groove welds shall be ground to a flush contour. Grinding shall be longitudinal. Transverse grinding will not be allowed.

WELD INSPECTION AND NONDESTRUCTIVE TESTING (NDT)

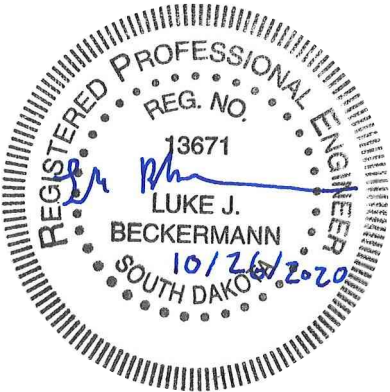
1. The Contractor shall be responsible for retaining a qualified Testing Agency to perform Visual, Magnetic Particle (MT), and Ultrasonic (UT) inspection of existing and new welds and to locate existing and potential crack tips. Inspectors performing Visual, MT, and UT inspection and determining crack tip locations shall be certified in accordance with Section 410.3 D of the Construction Specifications. The Contractor shall submit the Testing Agency to the Department at the Preconstruction meeting for approval by the Bridge Construction Engineer.
2. All Nondestructive Testing (NDT), required cleaning, preparation, and inspection shall be done in accordance with Clause 6 of the Bridge Welding Code. Existing paint shall be removed from the steel surfaces that require NDT. Power tools used for cleaning shall be in accordance with SSPC-3. The MT inspection shall be performed by the yoke method using half-wave rectified direct or alternating current. MT inspection results shall be reported on Form O-7 of Annex O and UT results shall be reported on Form F-4 of Annex F of the Bridge Welding Code.
3. The Contractor shall identify and mark all yield zones, yield lines, and associated damage and provide this information to the Engineer prior to the initiation of heat straightening and testing by either visual inspection or measurements.

4. Testing for defects and crack tips shall be made prior to any heat straightening. Repair options for the defects and crack tips shall be determined by the Bridge Construction Engineer—see notes on Repairs for NDT Determined Flaws. Repairs shall be made prior to any heat straightening.
5. As a minimum, the existing fillet welds shall be inspected as noted below. Defects shall be clearly marked on the girder in accordance with the Bridge Welding Code and a written record of the defects shall be given to the Engineer for transmittal to the Bridge Construction Engineer. Any suspected cracks shall be verified by magnetic particle inspection with the crack tips located. Crack tip locations shall be clearly marked on the girder and a written record of the crack tip location shall be given to the Engineer for transmittal to the Bridge Construction Engineer. Notify the Bridge Construction Engineer if any cracks or crack tips are located in the girder flange.

Girder 1:

- a. Visually Inspect 100% of the existing fillet welds in the deformed and damaged area. The deformed length is estimated to be 44 feet.
- b. MT test the top and bottom flange to web weld, on both sides of the web, a minimum of 12” beyond any yielded girder zones for an estimated 2,112 inches.
- c. MT test both sides of the stiffener to web weld and both sides top and bottom of the stiffener to flange welds at the diaphragms to be repaired. This includes the diaphragm stiffeners on each end of the diaphragm and the outside transverse stiffener for an estimated 320 inches.
- d. On the transverse stiffeners to be heat straightened or have welds removed and replaced, MT test the stiffener welds to web top, bottom, and both sides of the stiffener for an estimated 992 inches.
- e. In the area of web removal and replacement, MT test an area extending 6” on all sides of the removal area on each face for an estimated 2,592 square inches.
6. The above listed quantities and areas are provided as an estimate based on field documentation of the damage. If any other areas are identified as having potential flaws or require heat straightened these areas shall be tested as directed by the Engineer.
7. After heat straightening, the areas listed above shall be retested to ensure no additional cracks have developed. The estimated weld length and area for re-testing is 2,844 inches and 2,592 square inches.
8. New fillet welds of primary members (between web and flange) shall be 100% visually inspected and 100% magnetic particle inspected. Based on the results of the magnetic particle and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed fillet welds and any recommended repairs. Rejected defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs are complete. The estimated length for MT inspection is 156 inches.

9. All other new fillet welds shall be 100% visually inspected and 20% magnetic particle inspected. Based on the results of the magnetic particle and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed fillet welds and any recommended repairs. Rejected defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs are complete. The estimated length for MT inspection is 79 inches.
10. New groove welds shall be 100% visually inspected and 100% ultrasonically tested. Based on the results of the ultrasonic and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed groove welds and any recommended repairs. Rejected defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs are complete. The estimated length for UT inspection is 305 inches.
11. The plans listed quantity for nondestructive testing inspection is only an estimate. Magnetic Particle Weld Inspection and Ultrasonic Weld Inspection will be measured to the nearest inch. Magnetic Particle Weld Inspection, Impact Damage Repair will be measured to the nearest inch and area computed to the nearest square inch. Measurement shall be approved by the Bridge Construction Engineer.
12. All costs including labor, equipment, cleaning, and any incidentals necessary to perform the visual inspection, magnetic particle inspection and crack tip location shall be incidental to the contract unit price per inch for Magnetic Particle Weld Inspection.
13. All costs including labor, cleaning, paint removal, equipment, and any incidentals necessary to perform the visual inspection, magnetic particle inspection and crack tip location in the areas to be removed and replaced shall be incidental to the contract unit price per square inch for Magnetic Particle Weld Inspection, Impact Damage Repair.
14. All costs to remove the paint and clean all fillet welds to be nondestructive tested and remove the paint and clean all visible or potential crack tip locations shall be incidental to the contract unit price per inch for Magnetic Particle Weld Inspection or contract unit price per square inch for Magnetic Particle Weld Inspection, Impact Damage Repair.
15. All costs including labor, cleaning, equipment, and any incidentals necessary to perform the visual inspection and ultrasonic inspection of groove welds shall be incidental to the contract unit price per inch for Ultrasonic Weld Inspection.



NOTES (CONTINUED)

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020

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DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
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REPAIRS FOR NDT DETERMINED FLAWS

- Repair options for weld defects and crack tips shall be determined by the Bridge Construction Engineer. Two potential repair options are:
 - Drill 1" diameter hole in all crack tips.
 - Repair fillet weld defects by removing the weld with the air carbon arc process and then grinding flush. Grinding shall be in the longitudinal direction. Transverse grinding will not be allowed. The repair shall then be re-welded in accordance with the Bridge Welding Code.
- All labor, equipment, materials and incidentals necessary to drill holes in the web shall be incidental to the contract unit price per each for Drill Hole in Existing Steel.
- All labor, equipment, materials and incidentals necessary including air carbon arc removal and grinding of welds shall be incidental to the contract unit price per inch for Grind Weld.
- All labor, equipment, materials and incidentals necessary to re-weld the repair shall be incidental to the contract unit price per inch for Field Weld.
- Other repair options shall be at the discretion of the Bridge Construction Engineer.

HEAT STRAIGHTENING

- This Contract includes heat straightening of steel girders, including bottom flange, web, transverse stiffeners and diaphragms. Heat straightening is considered specialty work and only the following contractors are allowed to do this work. Contact:

Judd Holt
International Straightening Incorporated
901 E. Bristol Drive
Bismarck, ND 58501
Telephone: (701) 223-5972 or (701) 751-1683
Fax: (701) 751-1683
E-mail: isisteel@gmail.com
Website: www.steelstraightening.com

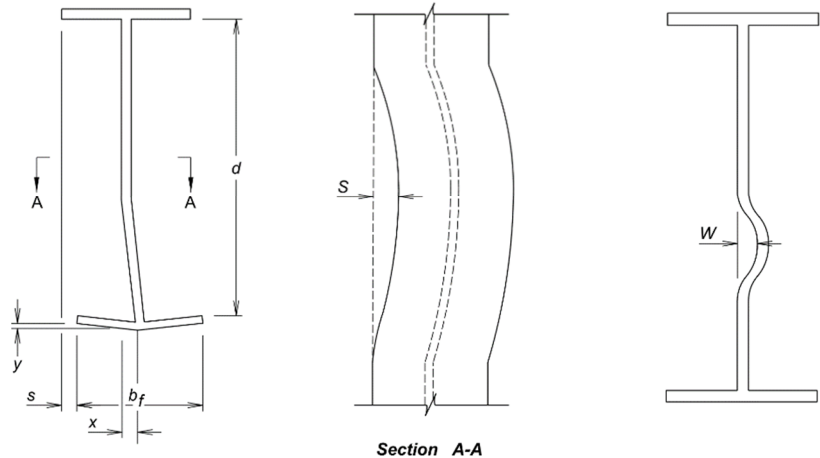
Darryl Thomas
Flame On, Inc.
12632 Wagner Road
Monroe, WA 98272
Telephone: (425) 397-7039
Fax: (425) 397-7002
Cellular: (425) 501-9855
E-mail: d.thomas@flameon.com
Website: www.flameoninc.com
- Heat Straightening requires nondestructive testing of both new and existing welds. The Contractor shall use a qualified testing agency subject to the approval by the Bridge Construction Engineer. The Contractor shall submit the testing agency to the Area Office for approval of the Bridge Construction Engineer. See Weld Inspection & Nondestructive Testing notes elsewhere in these plans.

- The equipment used for heat straightening shall be an oxygen-fuel combination. The fuel shall be propane or acetylene. The application of heat shall be by single or multiple orifice tips only. The size of the tip shall be proportional to the thickness of the heated material. As a guide, the following table shows the recommended tip sizes. No cutting torch heads are permitted.

Steel Thickness (in)	Orifice Type	Size
< 1/4	Single	3
3/8	Single	4
1/2	Single	5
5/8	Single	7
3/4	Single	8
1	Single Rosebud	8
2	Single Rosebud	4
3	Rosebud	5
> 4	Rosebud	5

- The temperature of all steel during heat straightening shall not exceed 1,200° F. The Contractor shall use one or more of the following methods for verifying temperatures during heat straightening.
 - Temperature sensitive crayons
 - Pyrometer
 - Infrared non-contact thermometer
- Material should be heated in a single pass and shall be allowed to air cool to below 250°F prior to re-heating.
- Hot Mechanical Straightening and Hot Working will **NOT** be allowed.
- Jacks used to aide heat straightening shall be placed so that forces are relieved as straightening occurs during cooling. Jacking shall be limited so that the maximum bending moment in the heated zone is less than 50% of the plastic moment capacity of the member or 50% of yield for local forces. The yield of the material is 36 ksi.

- The final dimensions of heat straightened structural members shall conform to the following tolerances:



d = original depth of web
bf = original width of flange
X = final displacement of web ≤ maximum of d/100 or 1/4"
Y = final displacement of edge of flange ≤ 1/4 "
W = maximum final local deformation in web ≤ 1/4"
S = sweep of flange from original edge of flange ≤ 1/2" over 20 ft

- All labor, materials, equipment, and any incidentals necessary to perform the required heat straightening shall be incidental to the contract lump sum price for Heat Straighten Steel Member(s).

REMOVE AND REPLACE WEB SECTIONS

- Cut and remove the portions of the web and weld as shown on the plans by the air carbon arc process or plasma cutting. All cut edges shall be ground smooth to their final size in preparation for welding. Grinding shall be longitudinal. Transverse grinding will not be allowed. The removed portions of the web shall be disposed of by the Contractor.
- The web sections shall be replaced and welded as shown in the plan details.
- During the removal and replacement procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).



NOTES (CONTINUED)

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020

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OF

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REMOVE AND REPLACE WEB SECTIONS (CONTINUED)

4. All labor, equipment, materials, welding, and any incidentals necessary to remove and replace the damaged portions of the web shall be incidental to the contract unit price per each for Remove and Replace Web.

REPAIR STEEL DIAPHRAGM

1. A portion of the existing diaphragm shown in the plans shall be removed prior to heat straightening and nondestructive testing. Removed diaphragm portion shall not be reused and shall be disposed of by the Contractor. After all heat straightening is complete, the diaphragm will be repaired.
2. Cutting of the existing diaphragm shall be accomplished using the air carbon arc process or plasma cutting. Weld removal shall be air carbon arc gouging.
3. Extreme care shall be exercised during the weld removal and cutting process so that no damage to the surrounding metal occurs. Any damage to the surrounding metal caused by the weld removal and/or cutting process shall be repaired by the Contractor to the satisfaction of the Engineer at no cost.
4. During the repair procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).
5. Grind all surfaces cut with air carbon arc process to remove high carbon deposits, provide a smooth finish, and radius all edges to accept paint.
6. All costs including equipment, material and labor to remove a portion of the steel diaphragm and to repair the steel diaphragm shall be incidental to the contract unit price per each for Repair Steel Diaphragm.

REMOVE AND REPLACE DAMAGED WELDS

1. The damaged welds shown in the plans shall be replaced by grinding damaged weld and re-welding. Grinding shall be in the longitudinal direction. Transverse grinding will not be allowed. Re-welding shall in accordance with the Bridge Welding Code.
2. All repaired welds shall be checked by non-destructive (MT) testing, see Weld Inspection & Nondestructive Testing (NDT) notes. Repair options for the defects found by the non-destructive testing shall be determined by the Bridge Construction Engineer.
3. All costs associated with grinding the damaged welds including all materials, equipment and labor shall be incidental to the contract unit price per inch for Grind Weld.
4. All costs associated with re-welding the transverse stiffener welds including all materials, equipment and labor shall be incidental to the contract unit price per inch for Field Weld.

REMOVAL OF SURFACE NICKS AND GOUGES

1. Grind the bottom flange of girder G1 as directed by the Engineer, to remove all sharp edges from surface nicks and gouges created by vehicle impact. The amount of material removed shall be kept at the absolute minimum necessary to remove the sharp edges and to minimize the section reduction of the existing structural members. Grinding shall be longitudinal. Transverse grinding will not be allowed. The grinding shall be done prior to heat straightening the girder.
2. All surface nicks and gouges shall be checked by non-destructive MT testing after grinding; see Weld Inspection & Nondestructive Testing (NDT) note. Repair options for the defects found by the nondestructive testing shall be determined by the Bridge Construction Engineer.
3. The quantity provided for Surface Grinding of Structural Steel is an estimate. The payment quantity will be per square inch as determined by the Engineer. This item may not be encountered and could be removed from the plans.
4. All costs associated with removing sharp edges from surface nicks and gouges including all materials, equipment and labor shall be incidental to the contract unit price per square inch for Surface Grinding of Structural Steel.

REPAIR UNDER SIDE OF BRIDGE DECK

1. This work shall consist of breaking out and patching of a portion of the underside of the bridge deck.
2. The underside of the existing deck shall be broken out as directed by the Engineer. Breakout limits shall be defined with a ¾" deep sawcut (unless specified otherwise in these plans), where practical, as approved by the Engineer. All existing reinforcing steel that will be exposed is scheduled for reuse and shall be cleaned and straightened to the satisfaction of the Engineer. Care shall be taken not to damage the reinforcing steel during concrete breakout. Any reinforcing steel that is damaged during concrete breakout shall be replaced or repaired, as approved by the Engineer, by the Contractor at no cost to the Department.
3. Extreme care shall be used during concrete breakout to prevent nicks, gouges, scratches, or damage to existing structural steel components to be reused. The Contractor shall not be allowed to use any impact type removal breakout equipment larger than power driven hand tools for within six inches of the top flange of the girder. In the event, any nicks, gouges, scratches, or other damage occurs, the Office of Bridge Design shall be immediately notified. All damage shall be repaired by the Contractor as recommended by the Office of Bridge Design. All costs involved in repairing any damage, including any non-destructive testing that may be required, shall be at the expense of the Contractor.

4. All broken out concrete and other removed material shall be disposed of by the Contractor. Disposal of discarded material shall be in accordance with the Environmental Commitments shown elsewhere in the plans.
5. Concrete used in vertical patching applications where forms are not practical shall consist of one of the following products, or equal as approved by the Office of Bridge Design.
- a. HD 25 VO
Dayton Superior
1125 Byers Road
Miamisburg, OH 45342
Phone: (800) 745-3700
Web site: www.daytonsuperior.com
- b. MasterEmaco N400RS
BASF Building Systems
889 Valley Park Drive
Shakopee, MN 55379
Phone: (800) 433-9517
Web site: www.buildingsystems.basf.com
- c. Meadow-Patch 20
W.R.Meadows, Inc.
P.O. Box 338
Hampshire, IL 60140-0338
Phone: (847) 214-2100
Web site: www.wrmeadows.com
- d. Speed Crete Red Line
The Euclid Chemical Company
19218 Redwood Rd.
Cleveland, OH 44110
Phone: (800) 321-7628
Web site: www.euclidchemical.com
6. The concrete repair material shall be applied and cured as recommended by the Manufacturer and as approved by the Engineer.



NOTES (CONTINUED)

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

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REPAIR UNDER SIDE OF BRIDGE DECK (CONTINUED)

- 7. During placement and curing time recommended by the Manufacturer of the patching material all vehicular traffic on the lane open for travel shall be stopped by flaggers before entering onto the bridge and then allowed to proceed at a maximum of 5 MPH. To safely slow traffic to cross the bridge during the deck curing period two advance flaggers may be required.
- 8. All cost associated with the repair including breaking out the portion of the existing concrete deck, furnishing and placing vertical repair material, labor, equipment, materials and any incidentals necessary and complete the work shall be per the contract unit price per square foot for Repair Under Side of Bridge Deck.
- 9. For information purposes only, the estimated total quantities for concrete breakout and patching material is 0.3 CuYd and 0.3 CuYd respectively.

CONCRETE BREAKOUT

- 1. The existing deck shall be broken out to the limits shown on the plans. Breakout limits shall be defined with a 3/4" deep sawcut (unless specified otherwise in these plans), where practical, as approved by the Engineer. All existing reinforcing steel that will be exposed is scheduled for reuse and shall be cleaned and straightened to the satisfaction of the Engineer. Care shall be taken not to damage the reinforcing steel during concrete breakout. Any reinforcing steel that is damaged during concrete breakout shall be replaced or repaired, as approved by the Engineer, by the Contractor at no cost to the Department.
- 2. Extreme care shall be used during concrete breakout to prevent nicks, gouges, scratches, or damage to existing structural steel components to be reused. Prior to deck removal, the limits of the girder top flanges shall be marked on top of the bridge deck. The Contractor shall not be allowed to use any impact type breakout equipment larger than power driven hand tools for slab removal within six inches of the actual limits of the top flange. At no time shall the use of any breakout method that will nick, gouge, or scratch the flange, or any other structural steel component to be reused, be allowed. If any nicks, gouges, scratches, or other damage occurs, the Office of Bridge Design shall be immediately notified. All damage shall be repaired by the Contractor as recommended by the Office of Bridge Design. All costs involved in repairing any damage, including any non-destructive testing that may be required, shall be at the expense of the Contractor. Any shear connectors damaged due to the Contractor's operation shall be repaired by the Contractor at no cost to the Department. Any shear connectors which have failed in service shall be replaced with 7/8" diameter x 4" end welded stud shear connectors for all girders and will be paid for at the contract unit price per each for Stud Shear Connector.
- 3. All broken out concrete, discarded reinforcing bars and expansion devices shall be disposed of by the Contractor. Any disposal of discarded material shall be in accordance with the Environmental Commitments.

- 4. The contract unit price per cubic yard for Breakout Structural Concrete shall include breaking out concrete, cleaning and straightening existing reinforcing steel, and disposal of all broken out material. All broken out concrete and other discarded material shall become the property of the Contractor and shall be disposed of on a site obtained by the Contractor and approved by the Engineer. See the Environmental Commitment notes.

ROADWAY CANOPY

- 1. The Contractor shall construct a rigid canopy above the roadway under the structure. The canopy is intended to capture smaller debris and not act as safety net for falling deck sections. As such, no traffic shall be allowed under an area of active deck removal even with the canopy in place. The exception is traffic will be allowed under the canopy if the only removal occurring is using hand tools and chipping hammers. The canopy is an added safeguard and does not relieve the Contractor of any responsibility for the safety of the public. The canopy shall meet the following minimum requirements.
 - a. The entire system shall be above the bottom of the girders.
 - b. Attachments shall not be made to the girders using welding.
 - c. The canopy shall be of a design and material which can adequately capture and contain falling debris as selected by the Contractor and approved by the Engineer.
 - d. The canopy shall be constructed for an entire span before any breakout can occur in that span.
 - e. The erection of the canopy shall be completed in a manner which will cause the least inconvenience to the traveling public.
- 2. The Contractor shall submit a detailed Demolition Plan, 30 days prior to any bridge deck removal. This Demolition Plan shall include all canopy details, bridge deck breakout details, a sequence of traffic control, and a sequence of bridge deck removal.
- 3. The Roadway Canopy shall be paid for at the contract lump sum price of Roadway Canopy. This payment shall include all construction, maintenance, and removal of the Roadway Canopy.

GALVANIC ANODE

- 1. The Contractor shall furnish and place galvanic anodes in the concrete repair areas specified in this plan set.
- 2. The galvanic anodes shall be supplied as one of the following:
 - a. Galvashield XP2
Vector Corrosion Technologies
65114 140th Ave.
Wabasha, MN 55981
Phone: (507) 259-2481
Website: www.vector-corrosion.com
 - b. Sentinel Silver
Euclid Chemical Company
19218 Redwood Road
Cleveland, OH 44110
Phone: (800) 321-7628
Website: www.euclidchemical.com
 - c. Sika FerroGard 670
Sika Corporation US
201 Polito Avenue
Lyndhurst, NJ 07071
Phone: (800) 933-7452
Website: <http://usa.sika.com>
- 3. The anodes shall be placed in accordance with manufacturer's recommendations and as approved by the Engineer. The anodes have not been shown on the drawings. The Contractor shall provide shop drawings of the galvanic anode installation including locations of the individual anodes to the Office of Bridge Design.
- 4. The anodes shall be placed with a minimum 3/4" cover and shall be set in embedding mortar per the manufacturer's recommendations. The anodes shall be fully encased in the concrete repair material. Where adequate cover does not exist, a concrete pocket shall be chipped out behind the anode to provide sufficient cover. The Contractor may need to chip around the reinforcing bar locally at the anode installation to make the electrical connection. The reinforcing steel at the connection location shall be cleaned per the manufacturer's recommendations to provide sufficient electrical connection and mechanical bond.
- 5. The electrical continuity of the electrical connections and reinforcing steel shall be confirmed per the manufacturer's recommendations.
- 6. The Contractor shall provide manufacturer's product literature and installation instructions to the Engineer 10 days prior to installation.
- 7. All costs associated with placing anodes including labor, equipment, materials and incidentals shall be included in the contract unit price per each for Galvanic Anode.

CLASS A45 CONCRETE, BRIDGE REPAIR

The type of cement, concrete strength requirements, aggregate requirements, slump and air requirements for the contract item Class A45 Concrete, Bridge Repair shall conform to the requirements of Section 460 of the Construction Specifications for A45 concrete used in bridge decks.



NOTES (CONTINUED)

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020

6 OF 15

DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
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STATE OF	PROJECT	SHEET NO	TOTAL SHEETS
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STUD SHEAR CONNECTOR

- 1. Prior to welding of the studs to the existing girders, the top surfaces of the existing girders that are to have studs welded on shall be clean of dirt, rust and any other foreign matter.
- 2. The shear connectors that will be attached to the existing girders shall be 7/8" diameter x 4 inches long and shall conform to ASTM A108, Grade 1015, 1018, or 1020. The connector shall meet the following minimum mechanical property requirements for type B studs:

Tensile Strength	60ksi
Yield Strength	50ksi
Elongation	20%
Reduction of area	50%

- 3. The shear connectors shall be installed in accordance with the Special Provision for Shear Connector Field Installation (Per Each).

AIR CARBON ARC CUTTING AND GOUGING

- 1. All removal of welds called for by the plans shall be accomplished using the air carbon arc process unless noted otherwise. Plasma cutting will also be allowed. If the Contractor plans to use plasma cutting, the Bridge Construction Engineer shall be notified and will provide the Contractor with additional requirements for this cutting method.
- 2. Before any air carbon arc cutting or gouging begins, lay out all cut lines on the steel surfaces using a marker that will be visible during the cutting process.
- 3. When grinding to a specified shape or dimension is required after air carbon arc cutting, lay out the shape on the steel surface with a visible marker and grind to the layout line. Air carbon arc gouging shall be done using DC, electrode positive.
- 4. Extreme care shall be exercised during the cutting or gouging process so that absolutely no damage (such as nicks, gouges, splattering) to the surrounding metal occurs. Any damage caused by the air carbon arc process shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the Department.
- 5. Grind all surfaces cut or gouged with the air carbon arc process to remove high carbon deposits, provide a smooth finish, and prepare metal for welding and/or to accept paint.

PAINT RESIDUE REMOVAL AND CONTAINMENT

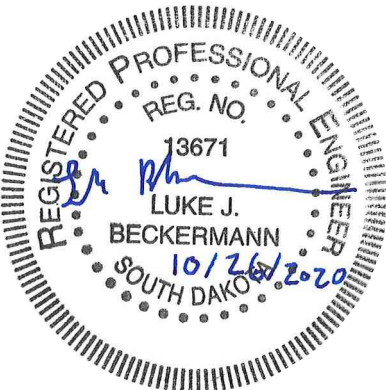
- 1. Paint removal on the existing bridge shall be in accordance with Section 412 of the Construction Specifications, except as modified by these notes.
- 2. The Contractor shall plan his operation to prevent releases of lead-containing material and other particulate matter into the surrounding air, water, and onto the ground, slope protection, and pavement. The Contractor shall be responsible for any corrective actions should a spill occur.

- 3. Collect all visible paint particles and blasting residue containing paint at the end of each workday from the work area. Inspect outside the containment and collect any paint particles or blasting residue that escaped the work area. Collect waste material by manual means, vacuum, or another method approved by the Engineer. Do not use air pressure or streaming water to assist in the waste collection process that could disperse the waste material.
- 4. In the event of a spill or inadvertent release, the Contractor shall immediately stop work, notify the Engineer, and report the release to the South Dakota Department of Environmental and Natural Resources (DENR). The Contractor shall be responsible for completing a spill reporting form and for all costs associated with appropriate corrective actions.

To report a release or spill, call DENR at (605) 773-3296 during regular office hours (8 a.m. to 5 p.m., Central Time). To report the release after hours, on weekends or holidays, call State Radio Communication at (605) 773-3231. Reporting the release to DENT does not meet any obligation for reporting to other state, local, or federal agencies. Therefore, the Contractor must also contact local authorities to determine the local reporting requirements for releases. DENR recommends that spills also be reported to the National Response Center at (800) 424-8802.

BRIDGE REPAINTING, CLASS I

- 1. All work affected areas and all new structural steel shall be painted in accordance with Section 412 of the Construction Specifications.
- 2. The intent at the heat straightened & repaired areas is to paint the entire girder surface for a distance of 6" outside of the outer edges of the heat straightening. The finished girder shall have a uniform paint appearance as approved by the Engineer. For informational purposes, the approximate total area under this item of repair is 564 square feet. The actual work affected area will only be known after all the nondestructive testing and heat straightening is complete.



NOTES (CONTINUED)

FOR

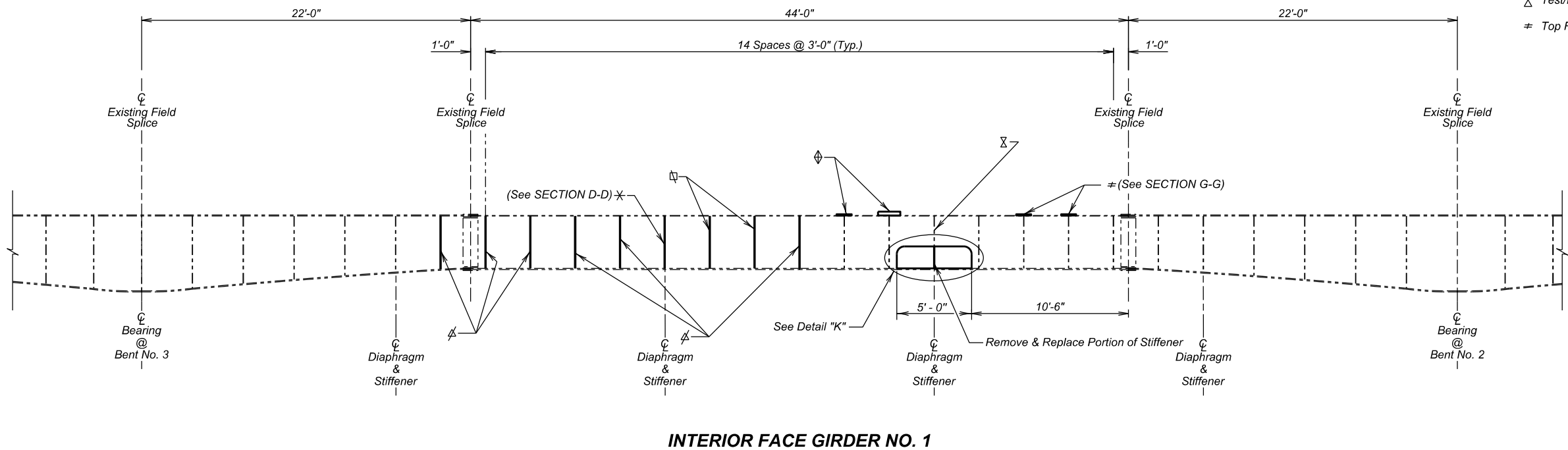
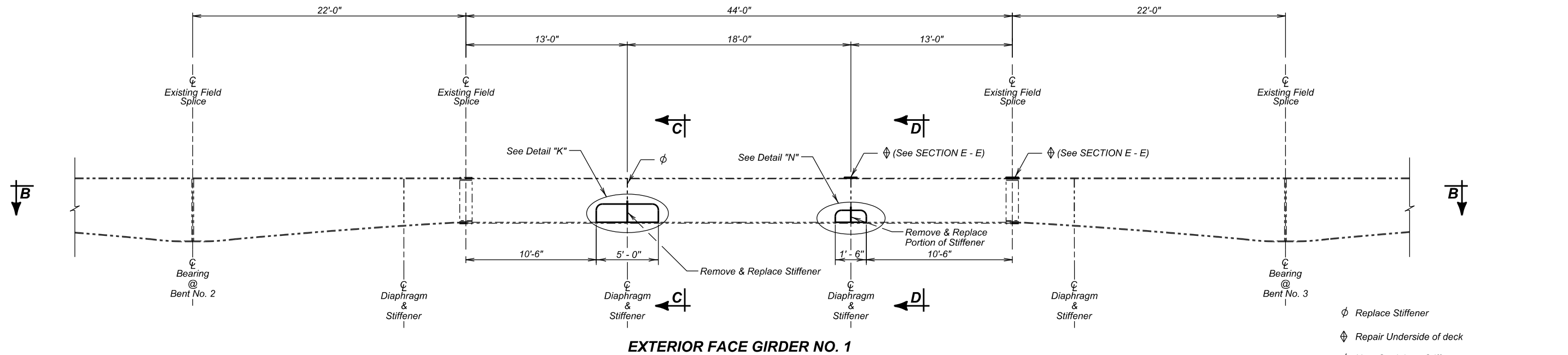
220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020 7 OF 15

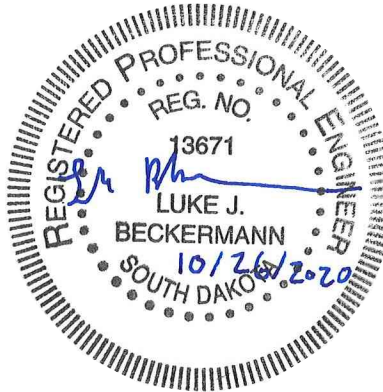
DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
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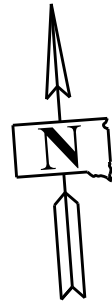
NOTES:

Girder web and bottom flange shall be heat straightened as necessary.
Concrete deck not shown for clarity.
Section B-B located on Sheet No. 9 of 15
Section C-C located on Sheet No. 10 of 15
Section D-D located on Sheet No. 11 of 15
Section E-E located on Sheet No. 12 of 15
Section G-G located on Sheet No. 12 of 15
Detail "K" located on Sheet No. 10 of 15
Detail "N" located on Sheet No. 11 of 15

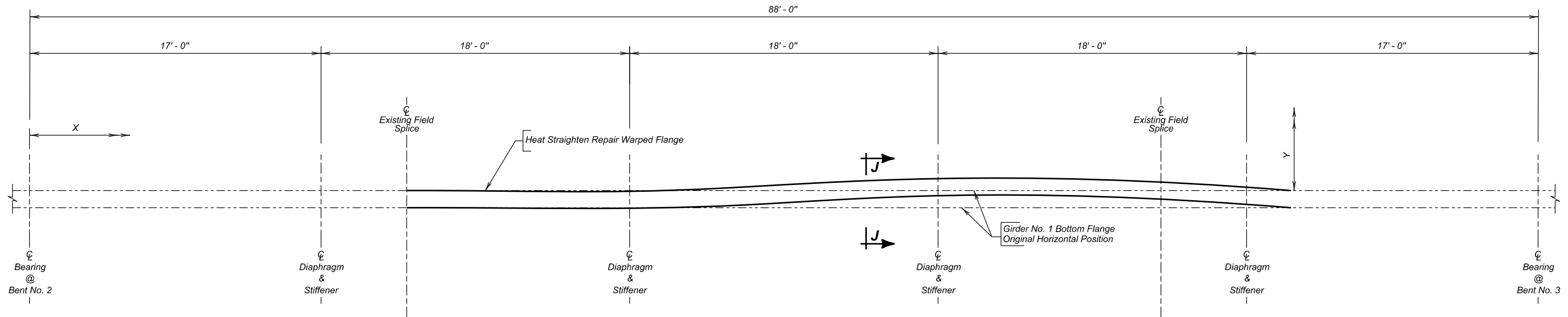


GIRDER NO. 1 REPAIR DETAILS (A)
FOR
220'-0" CONT. COMP. GIRDER BRIDGE
38'-0" ROADWAY 4°14' SKEW R.H.F.
OVER U.S. NO. 183 SEC. 14/15-T105N-R77W
STR. NO. 43-160-205 090 W-368
LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2020

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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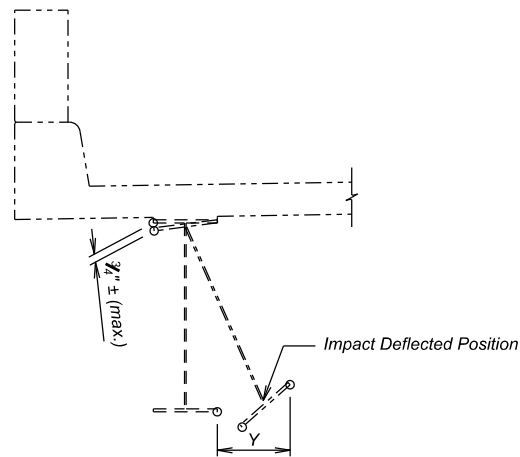


STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
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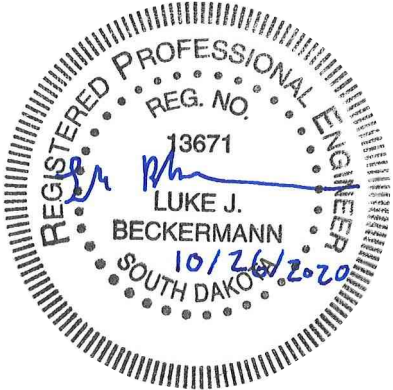
SECTION B-B
GIRDER NO. 1 - BOTTOM FLANGE

NOTE:
Heat Straighten Girder No. 1 Bottom Flange, Web, and Stiffeners. See Notes.



SECTION J-J
(Shown at X Measurements)

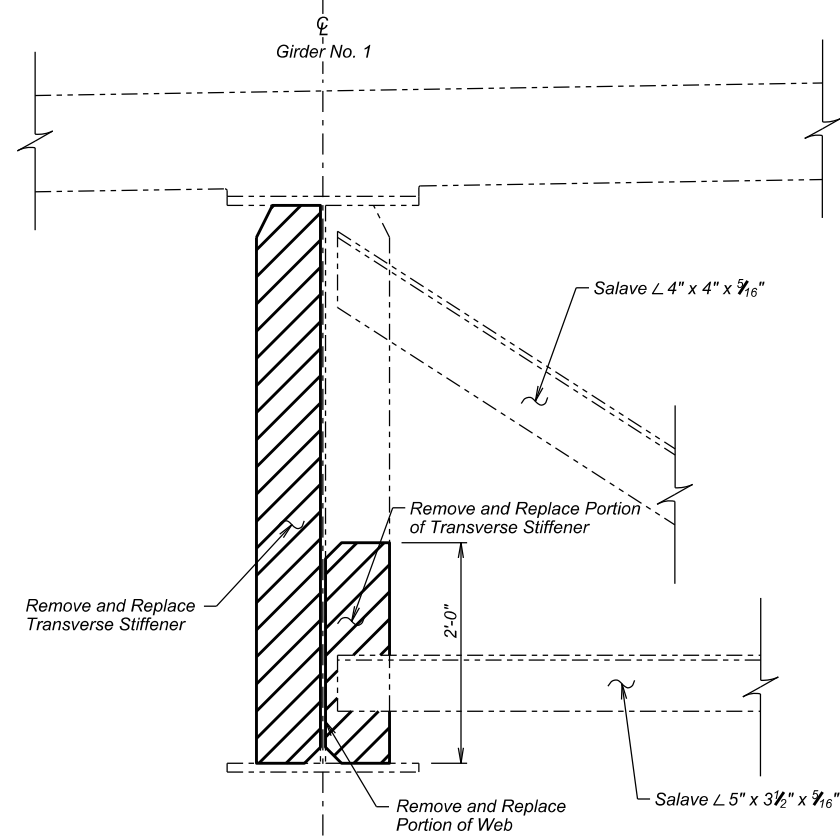
GIRDER NO. 1 HORIZONTAL IMPACTS DEFLECTED POSITION MEASUREMENTS	
X	Y
22'-0"	0"
29'-0"	-1/2"
37'-0"	0"
51'-6"	+8 3/4"
58'-7"	0"



GIRDER NO. 1 REPAIR DETAILS (B)
FOR
220'-0" CONT. COMP. GIRDER BRIDGE
38'-0" ROADWAY 4°14' SKEW R.H.F.
OVER U.S. NO. 183 SEC. 14/15-T105N-R77W
STR. NO. 43-160-205 090 W-368

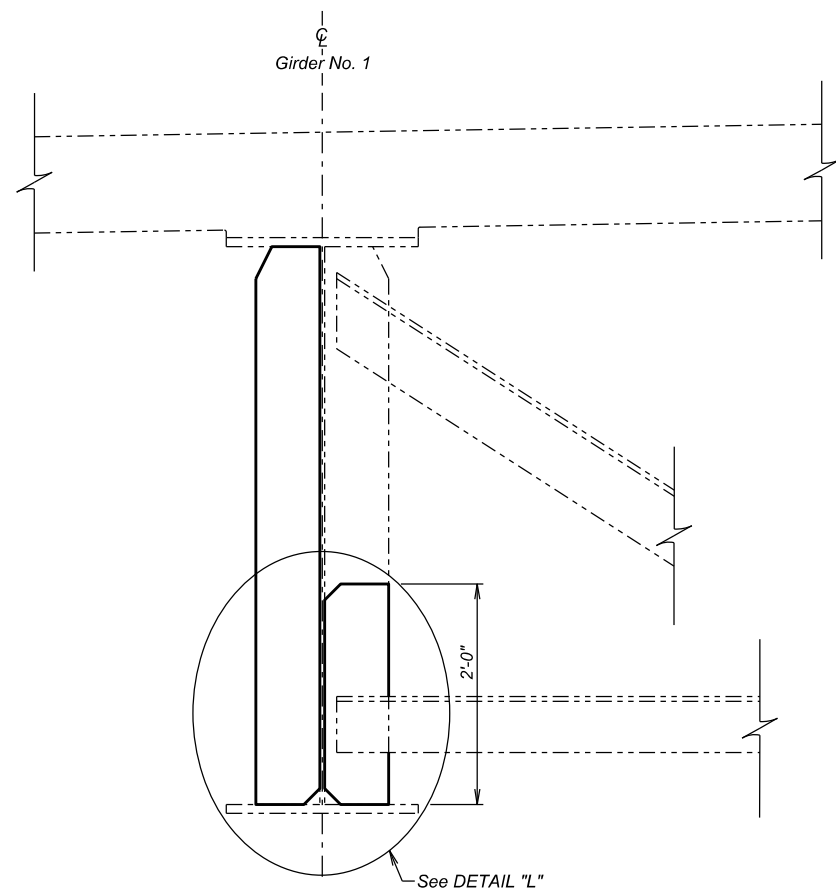
LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2020

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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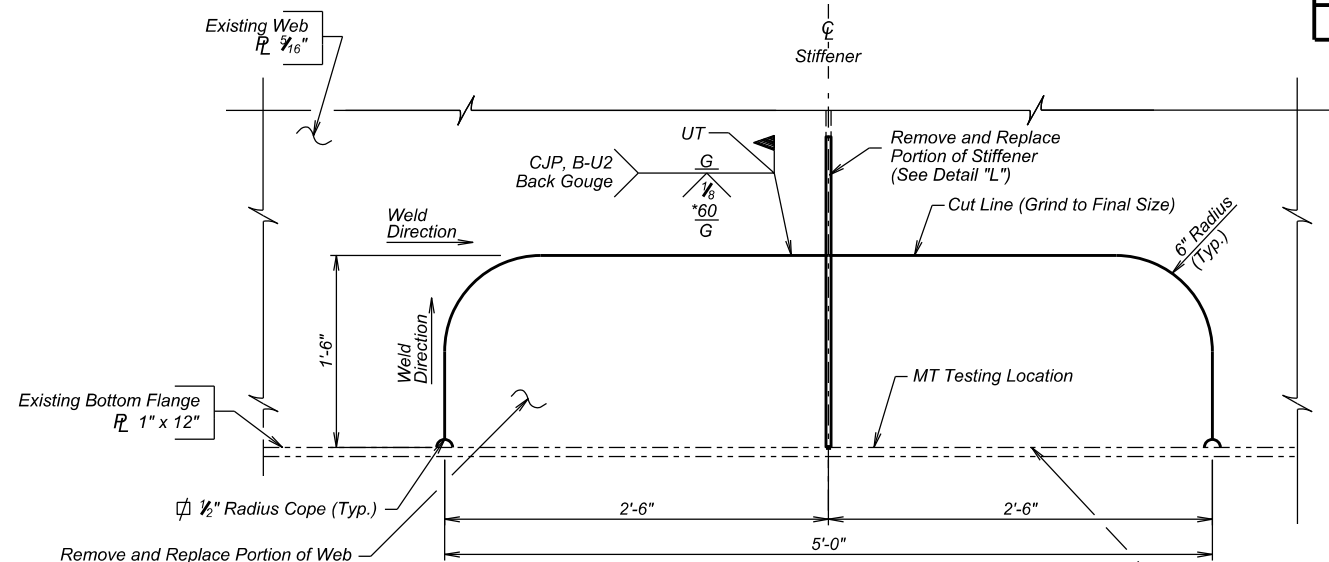
SECTION C - C

(Existing Stiffeners, Diaphragm and Web)



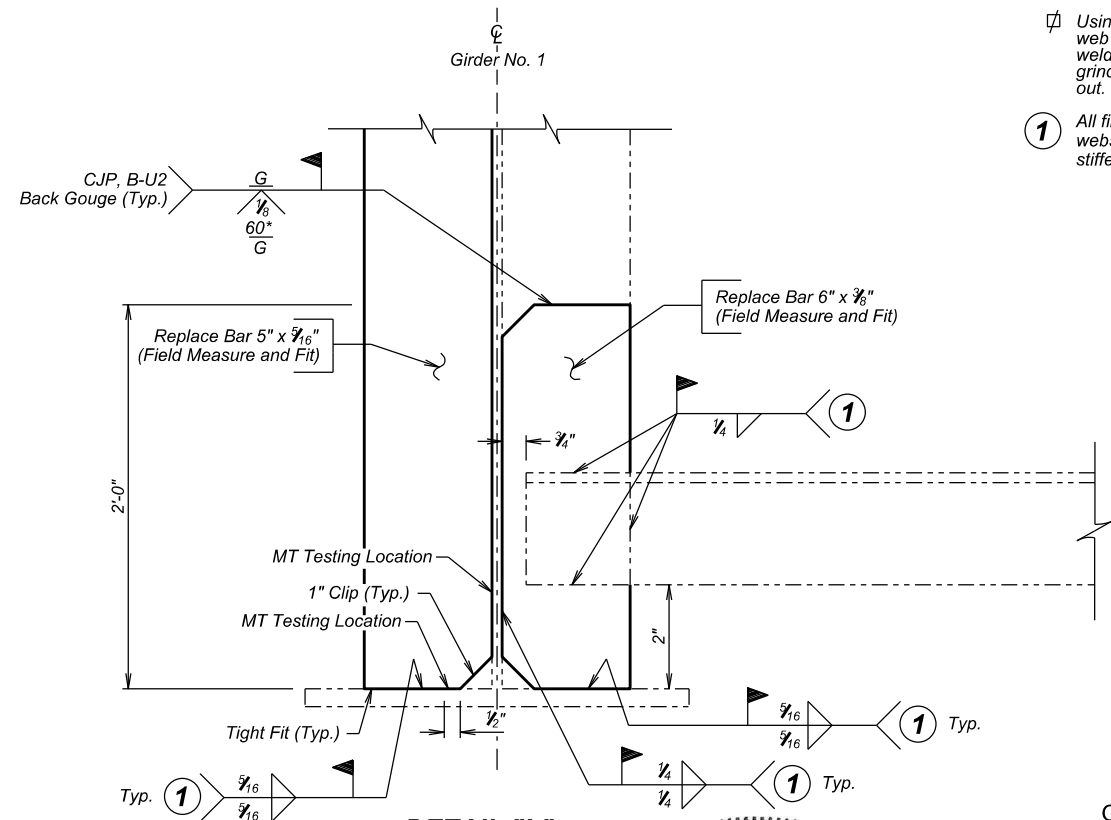
SECTION C - C

(New Stiffeners, Diaphragm and Web)



DETAIL "K"

(Interior View Shown)



DETAIL "L"

(New Stiffeners and Web)

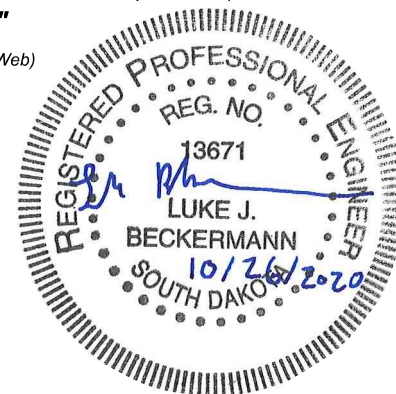
ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove and Replace Web	Each	1
Remove and Replace Transverse Stiffener	Each	2
Field Weld	In.	510
Grind Weld	In.	14

For informational purposes only, the estimated total structural steel quantity for Remove and Replace Web is 96 lbs.

For informational purposes only, the estimated total structural steel quantity for Remove and Replace Transverse Stiffener is 34 lbs.

Using the Air Carbon Arc Process, cut the remainder of web section out. After the new web section has been welded into place, resize the cope to a 1" radius by grinding the cut surface ensuring the weld tips are ground out. The finished surface shall be smooth.

1 All fillet welds attaching stiffeners to girder flanges and webs shall terminate 1/2" from edge of stiffener, flange, stiffener clip or cope, whichever is applicable.



GIRDER NO. 1 REPAIR DETAILS (C)

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

38'-0" ROADWAY

4°14' SKEW R.H.F.

OVER U.S. NO. 183

SEC. 14/15-T105N-R77W

STR. NO. 43-160-205

090 W-368

LYMAN COUNTY

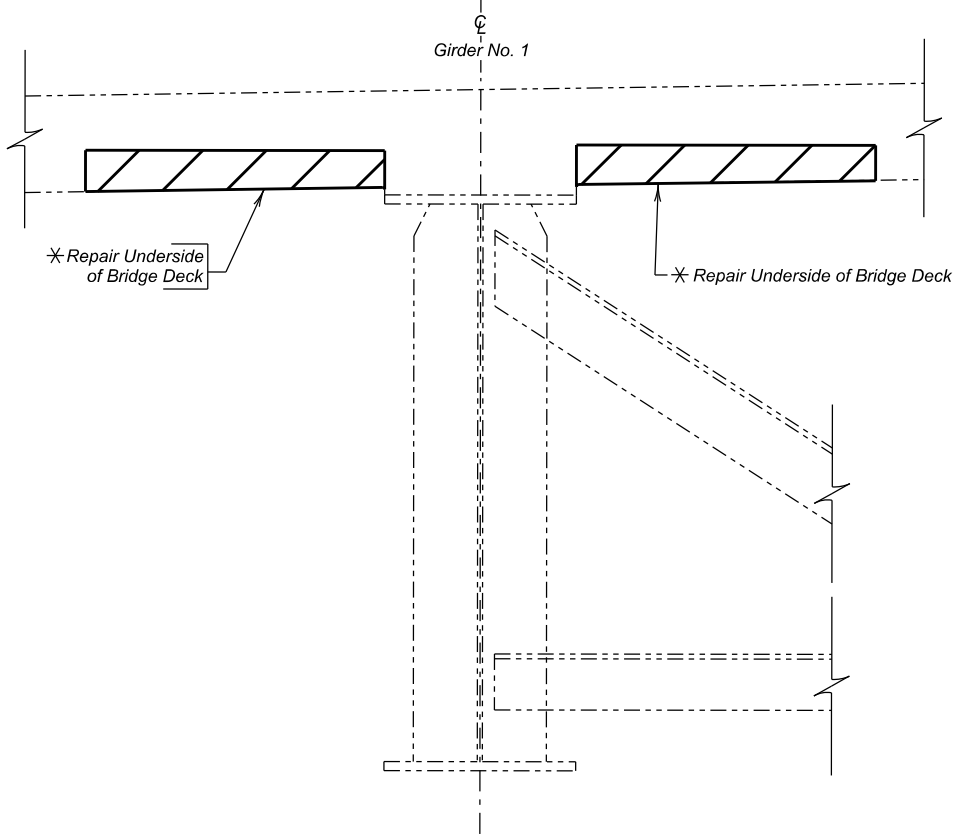
S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2020

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DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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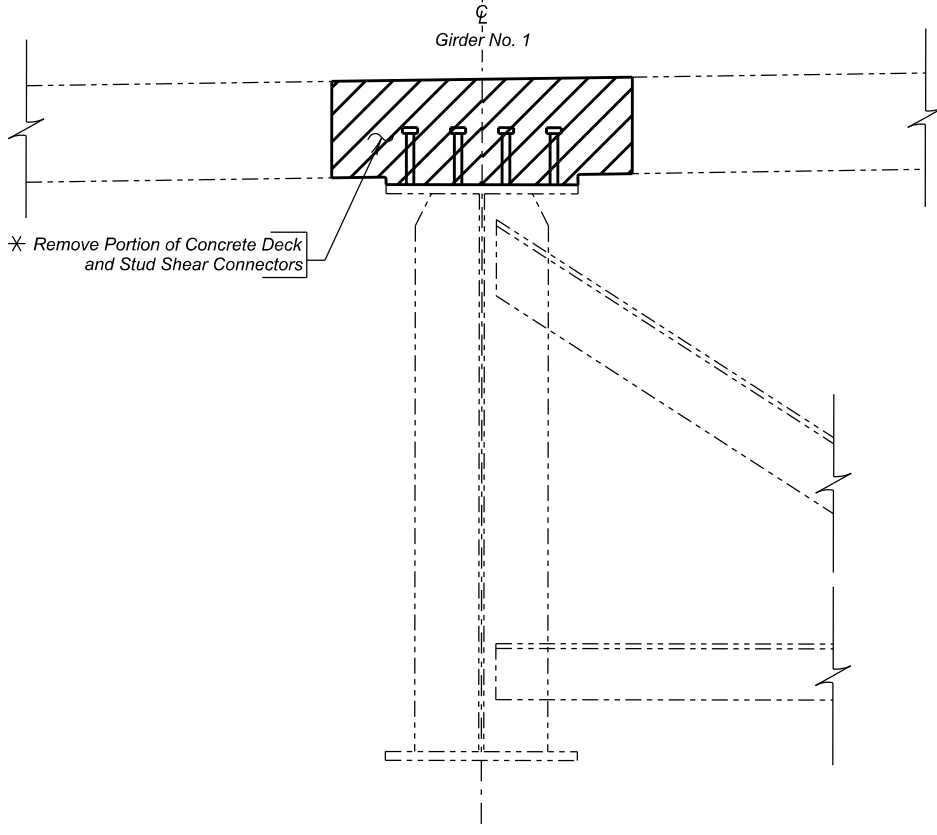
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
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SECTION E - E

(Existing Deck to be Removed)

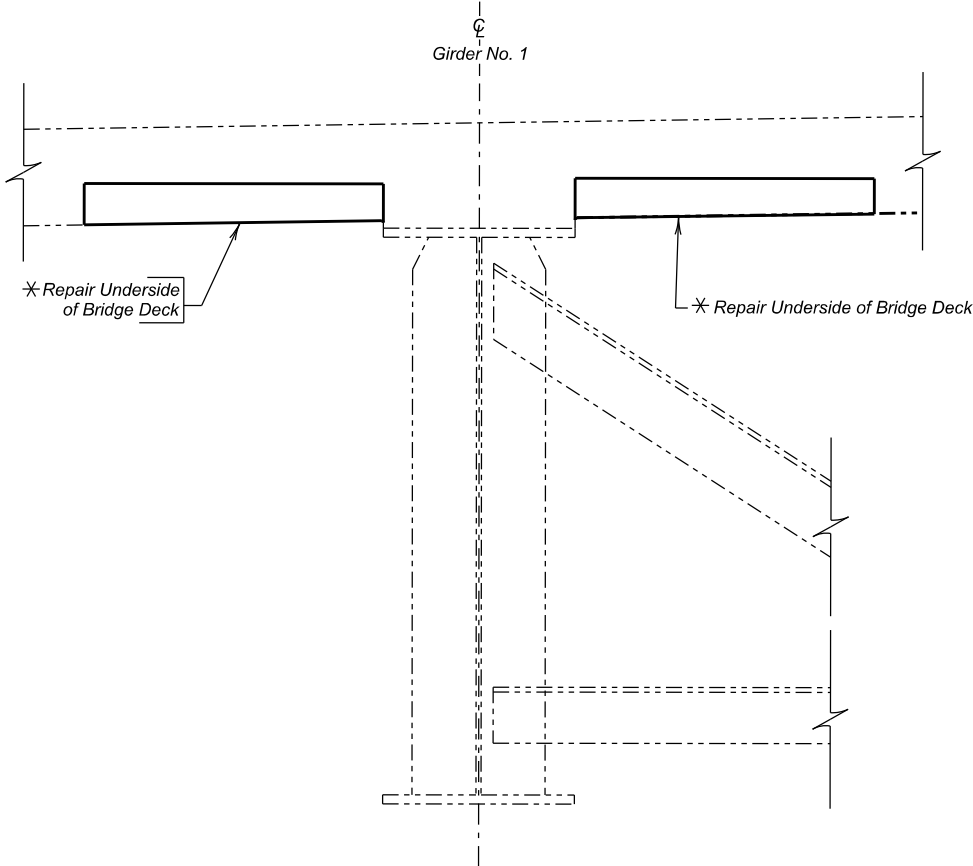
* As directed by the Engineer.



SECTION G - G

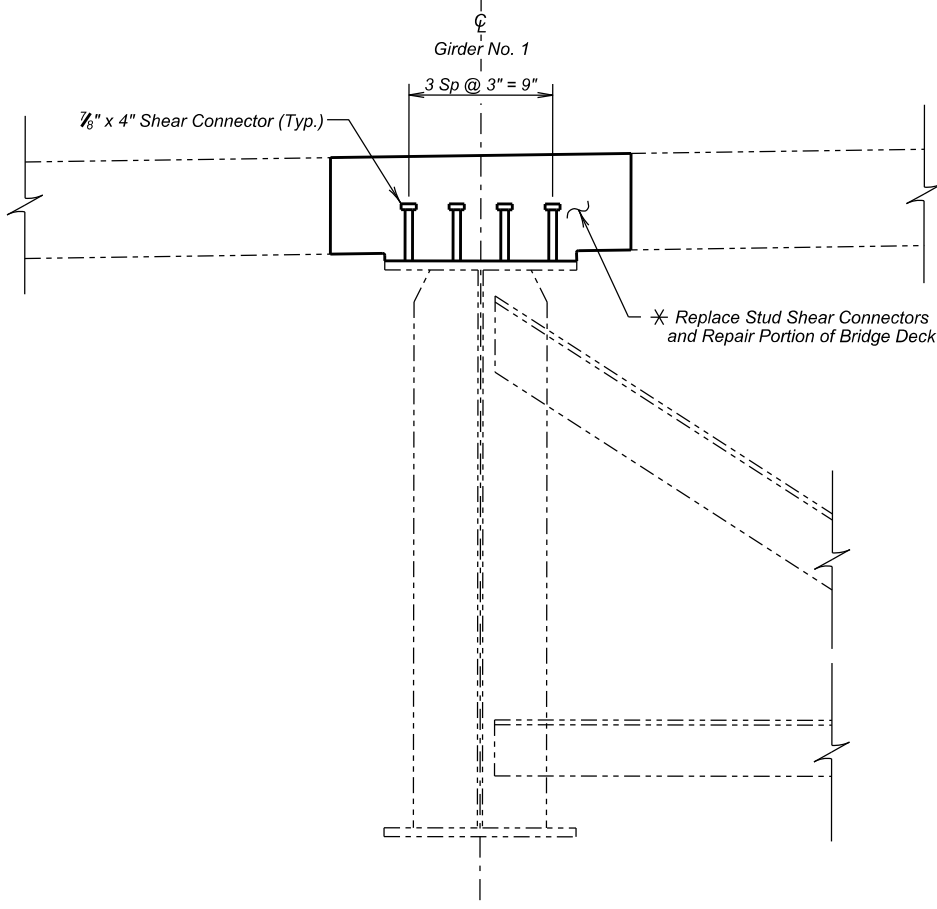
(Existing Deck to be Removed)

* As directed by the Engineer.



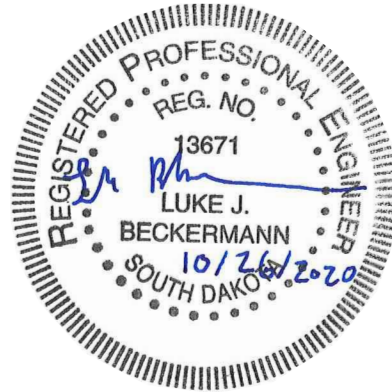
SECTION E - E

(New Deck)



SECTION G - G

(New Deck)



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Stud Shear Connector	Each	8
Breakout Structural Concrete	Cu. Yd.	0.3
Class A45 Concrete, Bridge Repair	Cu. Yd.	0.3
Repair Underside of Bridge Deck	Sq. Ft.	6
Galvanic Anode	Each	6

Note: Repair Underside of Bridge Deck includes removal and all repair to the underside of the bridge deck.

Full depth deck removal and repair are included in the bid items Breakout Structural Concrete and Class A45 Concrete, Bridge Repair, respectively.

GIRDER NO. 1 REPAIR DETAILS (E)
FOR
220'-0" CONT. COMP. GIRDER BRIDGE
38'- 0" ROADWAY 4°14' SKEW R.H.F.
OVER U.S. NO. 183 SEC. 14/15-T105N-R77W
STR. NO. 43-160-205 090 W-368

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2020

12 OF 15

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
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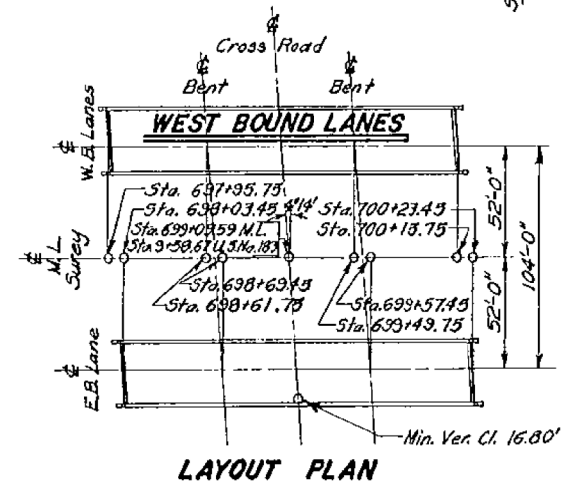
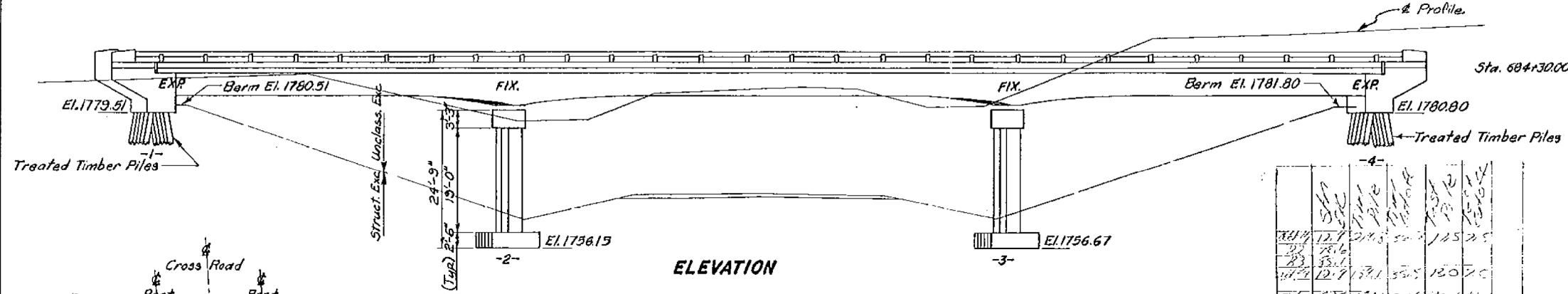
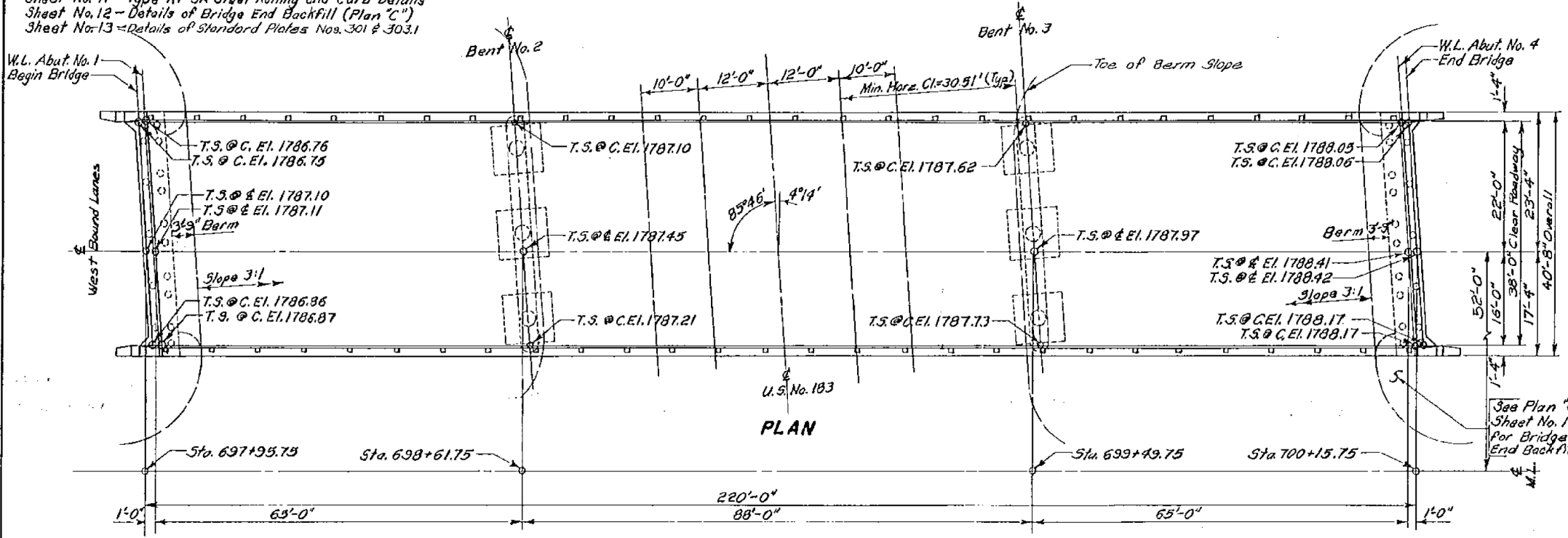
INDEX OF BRIDGE SHEETS:

- Sheet No. 1 - General Drawing and Quantities
- Sheet No. 2 - Subsurface Investigations
- Sheet No. 3 - Abutment Details
- Sheet No. 4 - Abutment Details
- Sheet No. 5 - Bent Details
- Sheet No. 6 - Slab and Diaphragm Details
- Sheet No. 7 - Girder Layout and Details
- Sheet No. 8 - Framing Diagram and Erection Data
- Sheet No. 9 - Details of Field Splice and Bearings
- Sheet No. 10 - End Device Details
- Sheet No. 11 - Type RT-3A Steel Railing and Curb Details
- Sheet No. 12 - Details of Bridge End Backfill (Plan "C")
- Sheet No. 13 - Details of Standard Plates Nos. 301 & 303.1

B.M. # 37 Elev. 1753.41
Rebar & Guards
200' Lt. Sta. 690+00

B.M. # 38 Elev. 1791.41
Rebar & Guards
200' Lt. Sta. 700+00

NOTE:-
T.S. @ C. El. = Top of Slab at Curb Elevation
T.S. @ E. El. = Top of Slab at Roadway Elevation



ESTIMATED QUANTITIES									
Bid Item No.	40005	40505	40555	40165	40705	40710	10410	10405	
ITEM	El. A' Conc.	Steel - Lbs.	Type RT-3A Steel Railing - Lin. Ft.	Treated Timber Piles - Lin. Ft.	Piles - Lin. Ft.	Excavation - Cu. Yds.	Bridge End Backfill - Cu. Yds.	* Lump Sum	
Superstructure	285.6	39815	158.815	450.3					
Abutment No. 1	341	3,930	110		16 @ 16' = 256'	1 @ 20' = 20'	13		
Bent No. 2	46.7	3,195					88		
Bent No. 3	46.7	3,195					91		
Abutment No. 4	341	3,930	110		16 @ 16' = 256'	1 @ 20' = 20'	13		
Totals	3072	86,265	159,035	450.3	512'	40'	205		* Lump Sum

One Treated Timber Test Pile shall be driven at Abutment No. 1 and No. 4 before the remaining piles are ordered.
For Information Only - The approximate volume of granular backfill will be 180 Cu. Yds. in place, and the length of the 6" x 6" perforated metal pipe will be 136 feet total for both Abutments.

SPECIFICATION NOTE:-

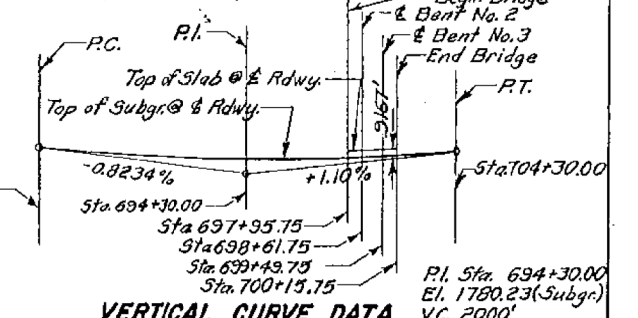
Use South Dakota Standard Specifications for Roads and Bridges, 1963 Edition, approved as Standard Sept. 21, 1964, and Required Provisions, Supplemental Specifications and/or Special Provisions, as included in the Proposal. All concrete shall be Class A (Type II Cement) with air entrainment.

GENERAL NOTES:-

- Design Specifications: A.A.S.H.O. Specifications for Highway Bridges, 1965 with Interim Specifications for 1966 and 1967.
- See NOTES on Sheets No. 1 thru No. 13.
- Longitudinal elements of the slab shall conform to the vertical curve.
- Rail Posts and End Blocks shall be built normal to grade.
- All Reinforcing Steel shall conform to A.S.T.M. Specifications A305 and A15, Intermediate Grade.
- Design Loading: HS20-44 A.A.S.H.O. and Alternate Loading, as designated in P.R.M. 20-4, Section 4c.
- The contractor shall have sufficient pile splice material on hand before pile driving is started. See Standard Plate No. 303.1 for splice details.
- Standard Plates referred to in these plans are the plates printed on Sheet No. 13 of 13 of these plans and are not intended to be referred to the Standard Plates Manual.
- In the event Pile Splice are used, see Std. Plate 301

EXCAVATION NOTES:-

- Footings for Bent No. 2 and No. 3 shall be cast upon solid undisturbed shale and carried into same to the elevation shown. Limits of shale excavation, below top of footings, shall be bound as nearly as practicable by the neat lines as shown in details of footings for Bents No. 2 and No. 3 on sheet No. 5 of 13.
- Shale shall develop a minimum bearing value of 4 tons per sq. ft. If the bearing value is less than 4 tons per sq. ft. at elevations shown, communicate with the BRIDGE SECTION.
- Final footing elevations for Bents No. 2 and 3 shall be established before ordering column reinforcing steel for the respective Bents. If final footing elevations must differ from those shown, communicate with BRIDGE SECTION.



ORIGINAL CONSTRUCTION PLANS

STR. NO. 43-160-205

(WEST BOUND LANES)

GENERAL DRAWING AND QUANTITIES

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

38'-0" ROADWAY 4'14" SKEW R.H.R.

OVER U.S. NO. 183 SEC. 14/18-T105N-R77W

STA. 697+95.75 TO 700+15.75 190-5(25) 222

Sta. No. 43-160-205 LYMAN COUNTY

SOUTH DAKOTA

DEPARTMENT OF HIGHWAYS

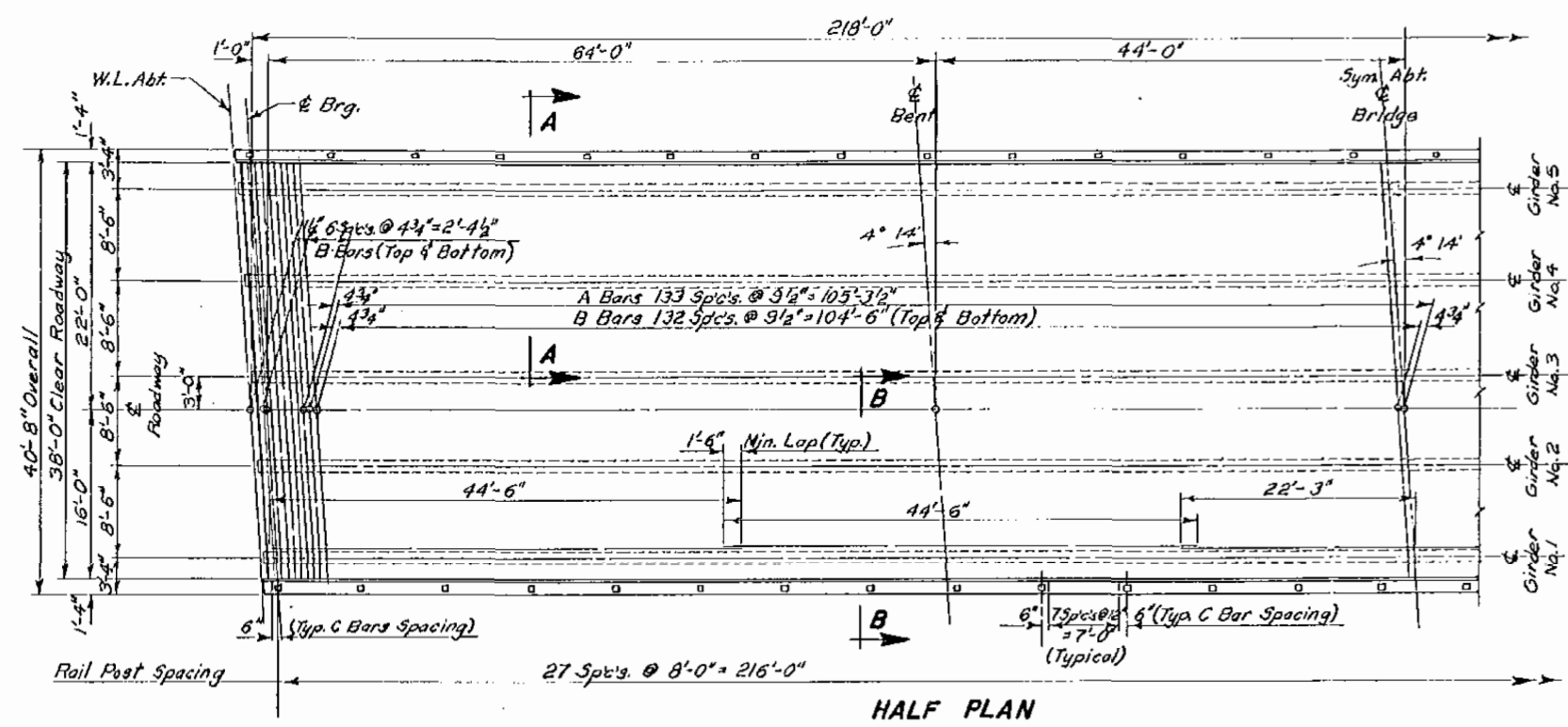
NOV. 1968

13 OF 15

-X271-

PLANS BY
BRIDGE SEC., S. DAK. DEPT. HWYS.

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
	C.R.	M.E.R.	



Bar	No.	Size	Length	Type
A	287	5	41'-6"	15
B	560	5	40'-3"	Str.
C	436	4	5'-9"	Ti
D	495	5	44'-6"	Str.
Di	8	5	12'-0"	Str.

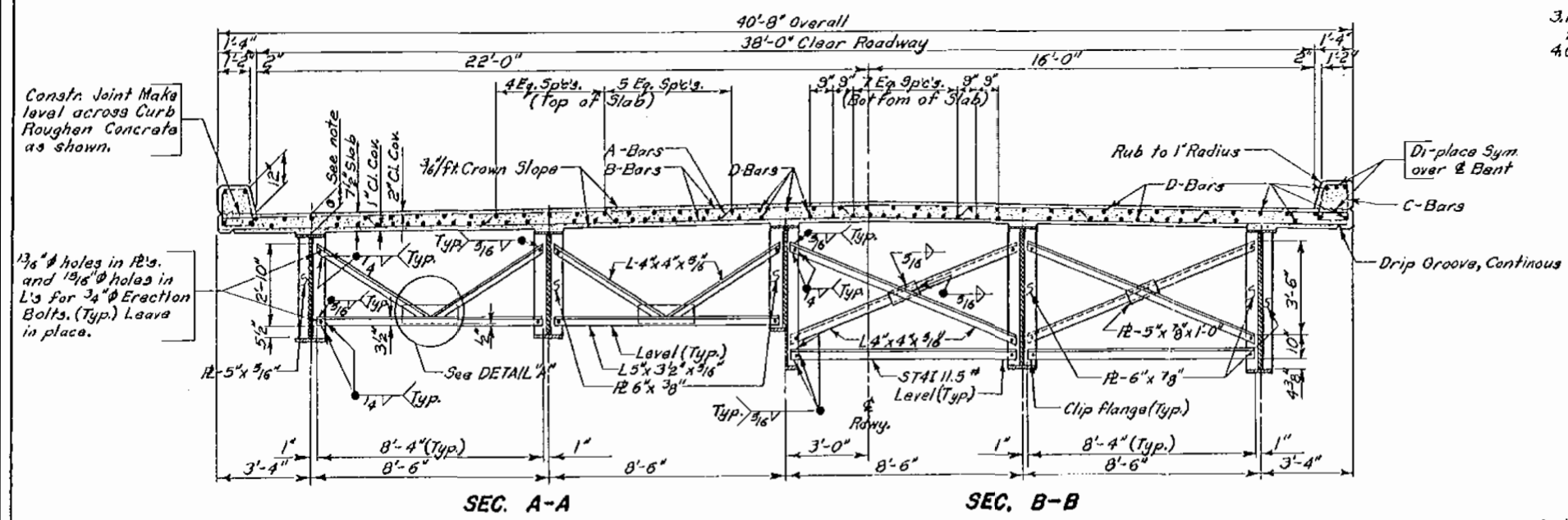
Bar	Length	Type
A	5'-0 3/4"	15
B	4'-0 3/4"	15
C	3'-10 1/4"	15
D	3'-10 1/4"	15
E	3'-10 1/4"	15
F	3'-10 1/4"	15
G	3'-10 1/4"	15
H	3'-10 1/4"	15
I	3'-10 1/4"	15
J	3'-10 1/4"	15
K	3'-10 1/4"	15
L	3'-10 1/4"	15
M	3'-10 1/4"	15
N	3'-10 1/4"	15
O	3'-10 1/4"	15
P	3'-10 1/4"	15
Q	3'-10 1/4"	15
R	3'-10 1/4"	15
S	3'-10 1/4"	15
T	3'-10 1/4"	15
U	3'-10 1/4"	15
V	3'-10 1/4"	15
W	3'-10 1/4"	15
X	3'-10 1/4"	15
Y	3'-10 1/4"	15
Z	3'-10 1/4"	15

NOTE-All dimensions are out to out of bars.

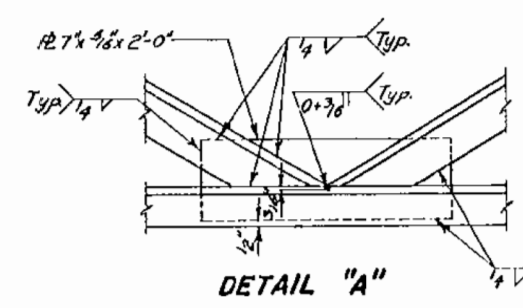
ITEM	UNIT	QUANTITY
Class A Concrete	Cu. Yds.	225.6
Reinforcing Steel	Lbs.	59,815
Structural Steel	Lbs.	188,815
RT-3A Steel Waling	Lin. Ft.	450.8

CONCRETE POURING NOTES.—
SLAB CONCRETE.—

1. Concrete slab may be poured continuously provide concrete retarding agents are used and the contractor has demonstrated capacity for such continuous operations.
2. Transverse construction joints are permitted and shall be positioned near the 1/4 points from the E of Bents.
3. If transverse construction joints are used the contractor shall submit to the BRIDGE SECTION for approval, plans and details of joints, as well as a sequence of pouring.
4. Curbs shall be poured after all the slab has been poured.



8" at Abutments and 7" at bents. These dimensions are at E Brgs. At other points along the girders this dimension shall be computed as shown on Erection Data Sheet.



ORIGINAL CONSTRUCTION PLANS

STR. NO. 43-160-205

(WEST BOUND LANES)
SLAB AND DIAPHRAGM DETAILS
 FOR

220'-0" CONT. COMP. GIRDER BRIDGE

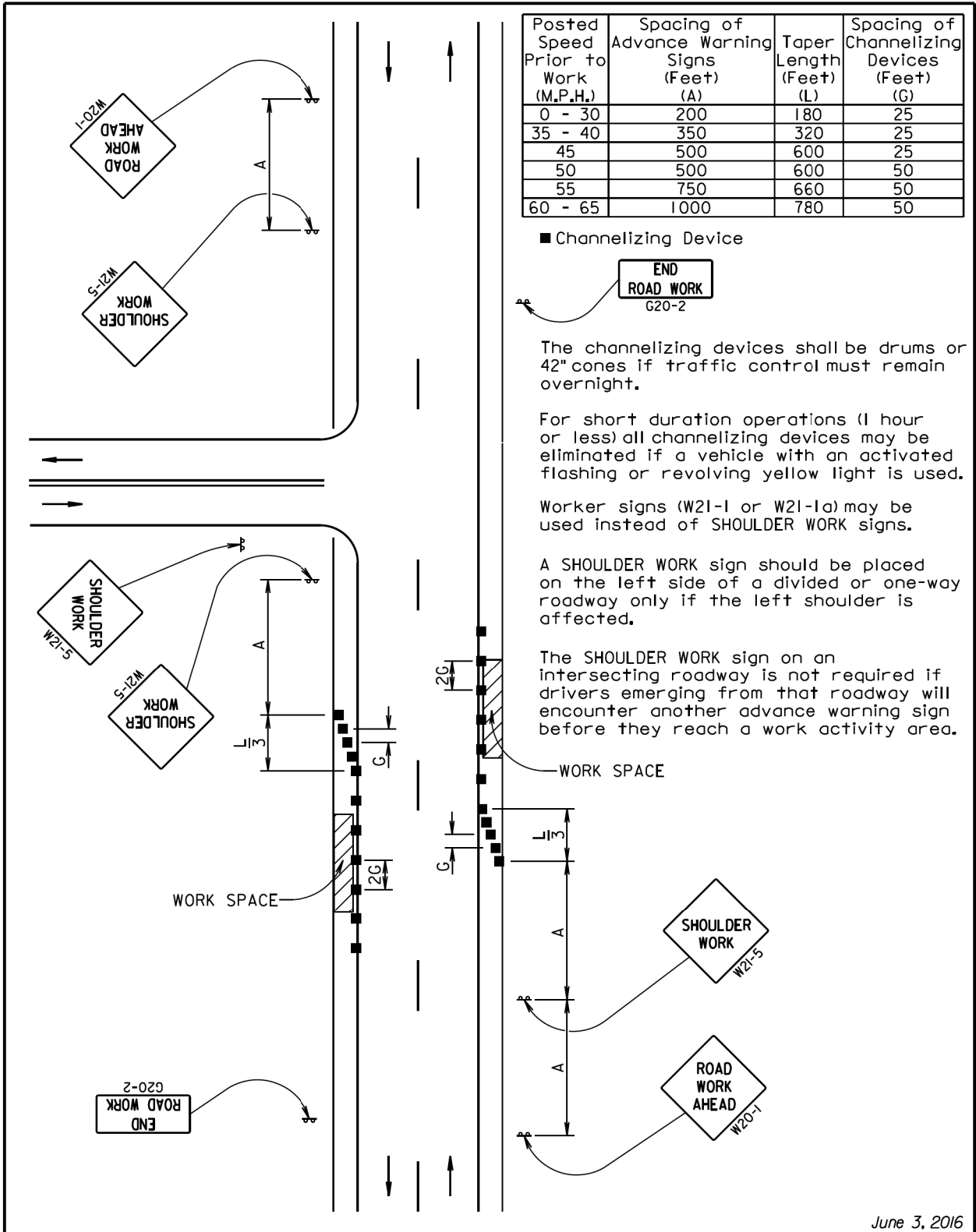
38'-0" ROADWAY 4"14' SKEW R.H.F.
 OVER U.S. NO. 183 SEC. 14/15-T105N-R77W
 STA. 697+95.75 TO 700+15.75 1 90-5(25)222

LYMAN COUNTY
 SOUTH DAKOTA HS20-44
 DEPARTMENT OF HIGHWAYS (8 ALT.)

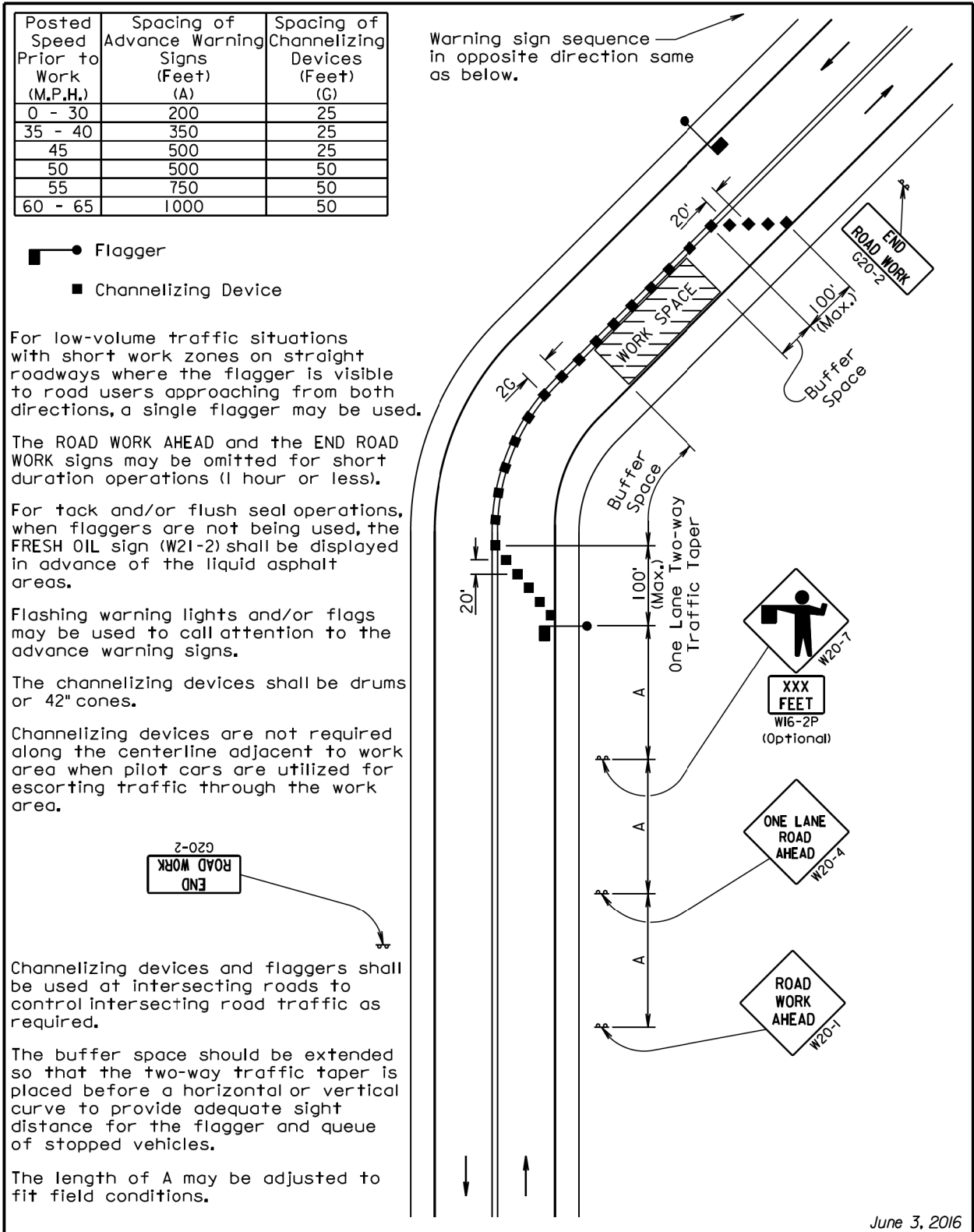
NOV. 1968 14 OF 15

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
R.K.	CD	W.C.P.	[Signature]

BRIDGE ENGINEER



June 3, 2016



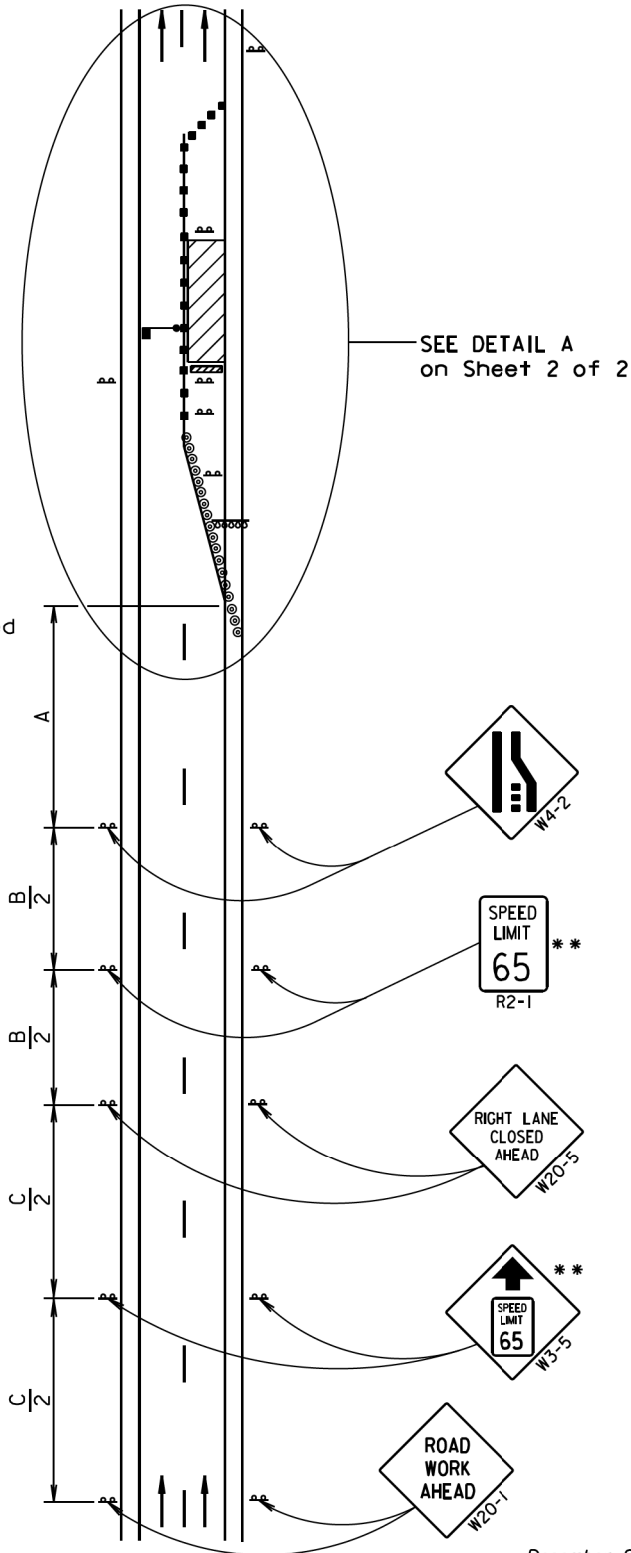
June 3, 2016

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A) (B) (C)		
0 - 30	200		
35 - 40	350		
45 - 50	500		
55	750		
60 - 65	1000		
	(A)	(B)	(C)
70 - 80	1000	1500	2640

- ** Speed appropriate for location.
- Reflectorized Drum
 - Channelizing Device

ROAD WORK AHEAD sign is only required in advance of the first lane closure.

High speed is defined as having a posted speed limit greater than 45 mph.



December 23, 2019

Published Date: 3rd Qtr. 2020	S D D O T	WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS	PLATE NUMBER 634.63
			Sheet 1 of 2

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)	Taper Length (Feet) (L)
0 - 30	25	180
35 - 40	25	320
45	25	600
50	50 *	600
55	50 *	660
60 - 65	50 *	780
70 - 80	50 *	960

- * Spacing is 40' for 42" cones.
- ** Speed appropriate for location.
- *** Use speed limit designated for the condition when workers are present in the work space. Signs will be covered or removed when workers are not present.

- Flagger (As Necessary)
- Reflectorized Drum
- Channelizing Device

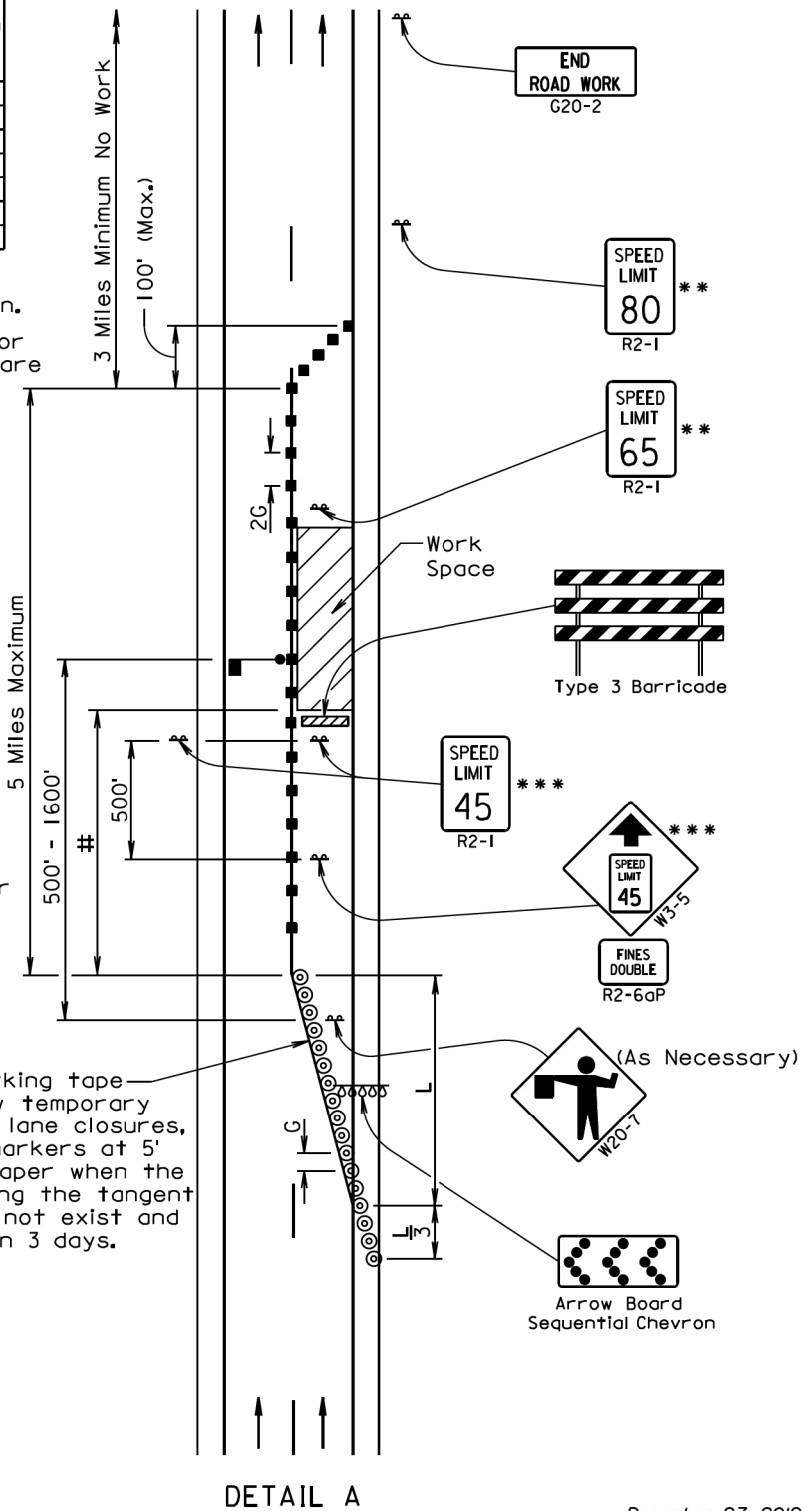
The Work Space will be a minimum of 500' from the end of the taper.

The FLAGGER sign will be used whenever there is a Flagger present.

The channelizing devices will be 42" cones or drums.

42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

4" white temporary pavement marking tape for right lane closures, 4" yellow temporary pavement marking tape for left lane closures, or temporary raised pavement markers at 5' spacing will be installed in the taper when the lane is closed overnight, and along the tangent section where the skip lines do not exist and the lane is closed for more than 3 days.

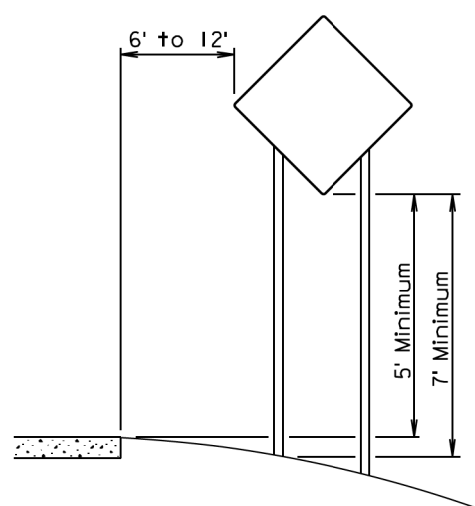


December 23, 2019

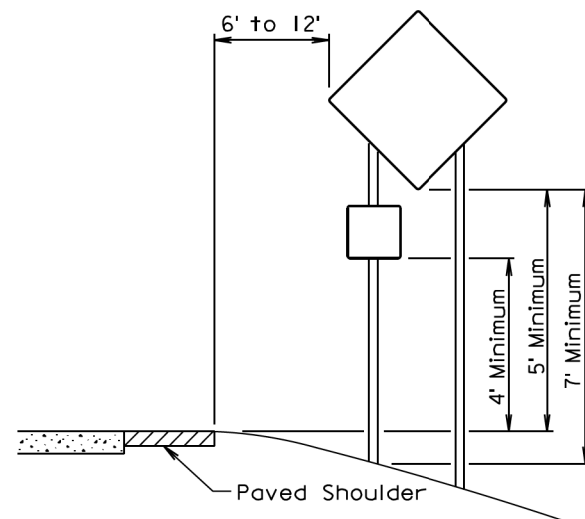
Published Date: 3rd Qtr. 2020	S D D O T	WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS	PLATE NUMBER 634.63
			Sheet 2 of 2

STATE OF SOUTH DAKOTA	PROJECT 090E-288 & 090W-368	SHEET 42	TOTAL SHEETS 42
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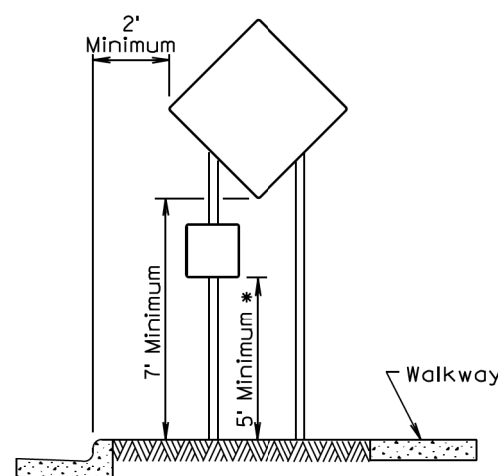
Plotting Date: 10/22/2020



RURAL DISTRICT

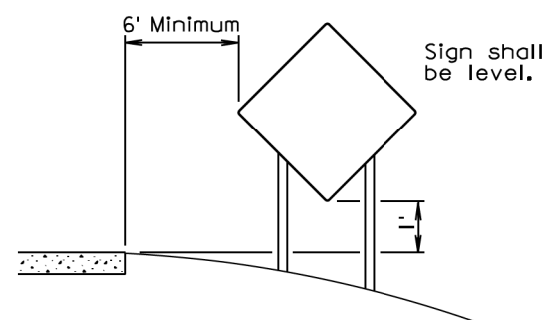


RURAL DISTRICT WITH
SUPPLEMENTAL PLATE



URBAN DISTRICT

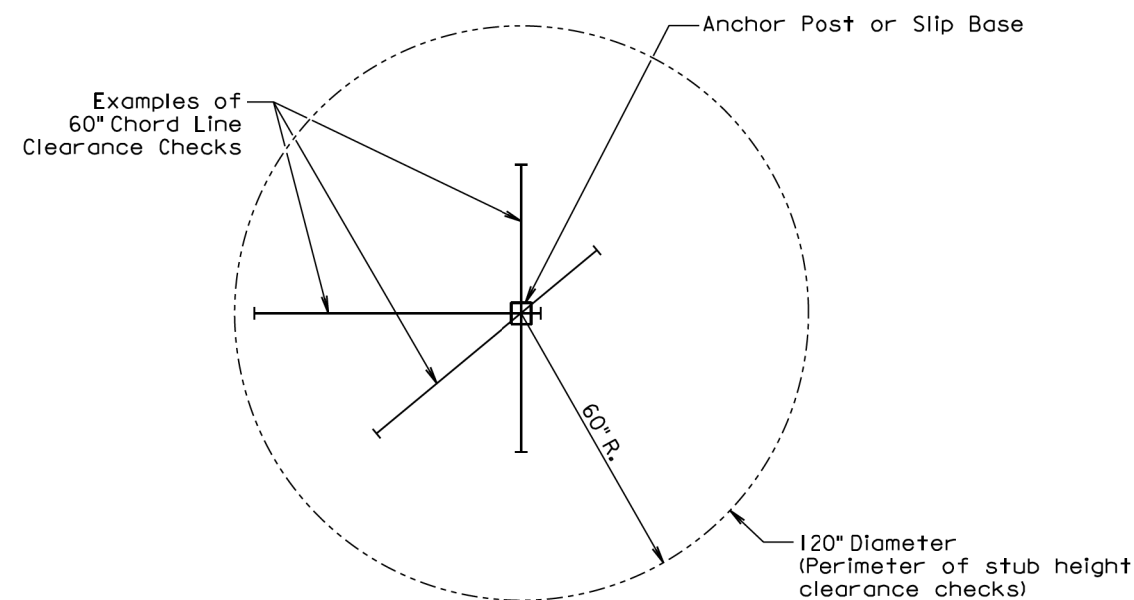
* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.



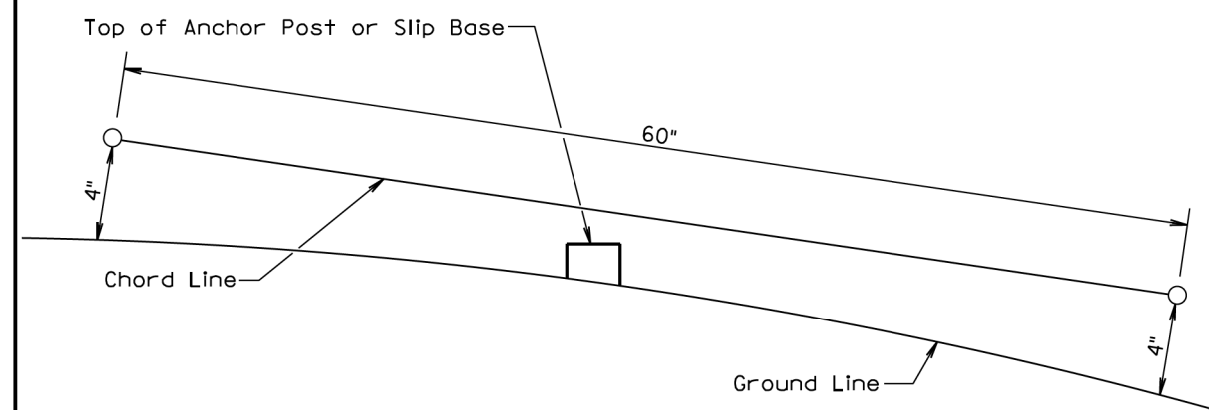
RURAL DISTRICT
3 DAY MAXIMUM
(Not applicable to regulatory signs)

September 22, 2014

Published Date: 3rd Qtr. 2020	S D D O T	CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)	PLATE NUMBER 634.85
			Sheet 1 of 1



PLAN VIEW
(Examples of stub height clearance checks)



ELEVATION VIEW

GENERAL NOTES:

The top of anchor posts and slip bases SHALL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.

At locations where there is curb and gutter adjacent to the breakaway sign support, the stub height shall be a maximum of 4" above the ground line at the localized area adjacent to the breakaway support stub.

The 4" stub height clearance is not necessary for U-channel lap splices where the support is designed to yield (bend) at the base.

July 1, 2005

Published Date: 3rd Qtr. 2020	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1